STRATEGIC DEFENSE SYSTEM

INTEGRATED LOGISTICS SUPPORT PLAN

DEPARTMENT OF DEFENSE
STRATEGIC DEFENSE INITIATIVE ORGANIZATION
WASHINGTON, D.C. 20301-7100

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STRATEGIC DEFENSE SYSTEM

INTEGRATED LOGISTICS SUPPORT PLAN

FOREWORD:

We have entered a phase in the development of the Strategic Defense System (SDS) that has a significant and irreversible impact on the future of the SDS. Whether that impact is positive or negative is linked to how well we accomplish our Integrated Logistics Support (ILS) planning. It cannot be completed without the combined efforts of logisticians and systems engineers at all levels of the SDS.

The Integrated Logistics Support Plan (ILSP) that comprises this document is a vehicle to enable logisticians and engineers to work together in a variety of areas critical to SDS readiness and supportability. Its purposes are to (1) provide a "capstone" for the system-element's ILSPs; (2) offer guidance regarding supportability impacts on elements throughout the system; and (3) provide a means to share information throughout the logistics and engineering organizations.

The prospective successful transition to Full-Scale Development (FSD) is based on the Supportability Research and Development Policy for the Strategic Defense Initiative. That policy continues to serve us well and facilitates the logical execution of this plan. These efforts, along with team work, will result in the successful planning for the deployment and sustainability of the SDS.

Your comments and ideas are welcome.

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LIST OF ACRONYMS

AFSC	Air Force Speciality Code
ALS	Advanced Launch System
AOS	Airborne Optical Sensor
ATE	Automatic Test Equipment
BIT	Built-In Test
BITE	Built-In-Test Equipment
BSTS	Boost Surveillance and Tracking System
CALS	Computer-Aided Acquisition and Logistics Support
CCB	Configuration Control Board
CC/SOIF	Command Center/System Operations and Integration Function
CFE	Contractor-Furnished Equipment
CI	Configuration Item
CMO	Configuration Management Office
CMP	Configuration Management Plan
CMWG	Configuration Management Working Group
CPCI	Computer Program Configuration Item
CRLCMP	Computer Resources Life-Cycle Management Plan
CRWG	Computer Resources Working Group
CSCI	Computer Software Configuration Item
CTEA	Cost and Training Effectiveness Analysis
DAB	Defense Acquisition Board
DEM/VAL	Demonstration/Validation
DEW/D	Directed Energy Weapon/Discriminators
DLA	Defense Logistics Agency
DoD	Department of Defense
DPML	Deputy Program Manager for Logistics
DT&E	Development Test and Evaluation
ECP	Engineering Change Proposal
ELV	Expendable Launch Vehicle
ERIS	Exoatmospheric Reentry-Vehicle Interception System
FCA	Functional Configuration Audit
FSD	Full-Scale Development
FSED	Full-Scale Engineering Development
FUE	First Unit Equipped
GBR	Ground-Based Radar
GFE	Government-Furnished Equipment
GSTS	Ground-Based Surveillance and Tracking System
HARDMAN	Hardware versus Manpower
HEDI	High Endoatomospheric Defense Interceptor
HVG	Hypervelocity Gun
IAW	In Accordance With
IC	Integrated Circuit
ICS	Internal Control System
ICWG	Interface Control Working Group
ILS	Integrated Logistics Support
ILSM	Integrated Logistics Support Manager

ILSMT	Integrated Logistics Support Management Team
ILSP	Integrated Logistics Support Plan
IRS	Interface Requirements Specification
ISD	Instructional System Development
ISP	Integrated Support Plan
ISWG	Integrated Support Working Group
LCC	Life-Cycle Cost
LSA	Logistics Support Analysis
LSAP	Logistics Support Analysis Plan
LSAR	Logistics Support Analysis Record
LSP	Logistics Support Plan
M&P	Manpower and Personnel
MCA	Military Construction Authority
MCCR	Mission Critical Computer Resources
MOS	Military Occupational Speciality
MTBF	Mean Time Between Failure
MTBMA	Mean Time Between Maintenance Activity
MTTR	Mean Time To Repair
NEC	Navy Enlisted Classification
NTB	National Test Bed
O&S	Operations and Support
OMV	Orbital Maneuvering Vehicle
ORU	Orbital Replacement Unit
OT&E	Operational Test and Evaluation
OTV	Orbital Transfer Vehicle
PCA	Physical Configuration Audit
PHS&T	Packaging, Handling, Storage, Transportation
PMO	Program Management Office
PPL	Prescribed Parts List
P^3I	Preplanned Product Improvement
QA	Quality Assurance
RAM	Reliability, Availability, and Maintainability
RCM	Reliability Centered Maintenance
R&M	Reliability and Maintainability
RV	Reentry Vehicle
SASS	Space-Based Assets Support System
SBI	Space-Based Interceptor
SBR	Space-Based Radar
SCCB	System Configuration Control Board
SCMP	Software Configuration Management Plan
SCP	System Concept Paper
SDI	Strategic Defense Initiative
SDP	Software Development Plan
SDS	Strategic Defense System
SE&I	Systems Engineering and Integration
SE/TE	Support and Test Equipment
SOW	Statement of Work
SETA	Systems Engineering and Technical Assistance
SPCO	Software Policy Control Officer

SPWC	Software Policy Waivers Committee
SRO	System Readiness Objectives
SRS	Software Requirements Specification
SSDD	System/Segment Design Document
SSTS	Space-Based Surveillance and Tracking System
T&E	Test and Evaluation
TEMP	Test and Evaluation Master Plan
TEV	Test, Evaluation, and Verification
TEWG	Test and Evaluation Work Group
TMDE	Test, Measurement, and Diagnostic Equipment
VHSIC	Very High Speed Integrated Circuit
VLSI	Very Large Scale Integration
WPD	Work Package Directive

SECTION I

GENERAL

1.0 INTRODUCTION

The Integrated Logistics Support Plan (ILSP) for the Strategic Defense System (SDS) is a comprehensive and detailed system-level plan and schedule. Its purpose is to implement the concepts, techniques, and policies required to achieve SDS Integrated Logistics Support (ILS) objectives. It was prepared in accordance with the Supportability Research Policy for the Strategic Defense Initiative (SDI).

The Integrated Support Plan (ISP) provides for the analysis and implementation of ILS issues by specifying the use of Department of Defense (DoD) Directive 5000.39 for logistics support. As an implementation document, this ILSP uses the DoD ILS elements. It generally meets the intent of Department of the Army Pamphlet 700-55, Instructions for Preparing the Integrated Logistics Support Plan; Air Force Regulation 800-8, Integrated Logistics Support (ILS) Program; and the Defense System Management College, Integrated Logistics Support Guide as tailored to SDS ILS planning requirements.

This Strategic Defense Initiative Organization (SDIO) ILSP will be coordinated with and used by participating Military Services and DoD Agencies as a capstone to individual Military Service and DoD Agency ILSPs. When combined, these documents provide a comprehensive structure for both SDS and system-element ILS programs.

The plan is written primarily for use at the system (i.e., SDS) level, in conjunction with the Service-level ILSPs. It is intended that this ILSP will be developed, through an iterative process, to fulfill the top-level planning requirements of logistics managers throughout the SDS.

The document commences with a brief description of the SDS. The program management structure is then presented, and is followed by an initial sketch of a system-level Integrated Logistic Support Management Team (ILSMT).

Section II explains the concepts, goals, and strategies for ensuring that the SDS is fully supported, at an affordable cost, throughout its life cycle. It contains an overview of the operational concept, from which the support concept is derived; a note on system readiness goals; an initial framework for a logistics acquisition strategy; supportability test and evaluation concepts that will have a specific impact upon ILS planning; and a discussion of each of the ILS elements.

Section III contains the SDS and Service-level milestones that are essential for successful system acquisition and support.

There are five annexes. Annexes A and B contain the Service ILSPs and the system-element ILSPs respectively. Annex C describes the organization and functions of the SDI ILSMT. Annex D is the SDIO Supportability Document Tree. Annex E is the Acquisition Related Documents.

The document tree represents, in list form, those documents that impact most on those supportability issues associated with the SDI. It is an automated spreadsheet-based hierarchy of documents shown with organizational and functional relationships. It has been designed to accept additional documents, organizations, and functional areas as required. This will facilitate subsequent updates of this ILSP while providing useful information regarding logistics/supportability references to program managers and logisticians.

2.0 STRATEGIC DEFENSE SYSTEM DESCRIPTION

Phase I SDS is the first step in a defense system designed to protect the United States and its allies from enemy ballistic missile attack. The Phase I SDS will be comprised of the system-elements listed below:

- CC/SOIF
- Midcourse Sensor Systems (MSS)
  - Space-Based Surveillance and Tracking System (SSTS)
  - Ground-Based Surveillance and Tracking System (GSTS)
- Boost Surveillance and Tracking System (BSTS)
- Exoatmospheric Reentry-Vehicle Interception System (ERIS)
- Space-Based Interceptor (SBI) System
- SDS Transportation System

Detailed descriptions of the system-elements are contained in the Defense Acquisition Board (DAB) Milestone I System Concept Paper (SCP) and its appendices and in the Service/system-element ILSPs attached to this plan. System-elements that may be added during follow-on phases include:

- Ground-Based Radar (GBR)*
- Space-Based Radar (SBR)
- Airborne Optical Sensor (AOS)
- Directed Energy Weapons/Discriminators (DEW/D)
- Hypervelocity Gun (HVG)
- High Endoatmospheric Defense Interceptor (HEDI)*
- Space Assets Support System (SASS)

*Possible Phase I candidate

SDS element relationships are illustrated in Figure 2.0-1.

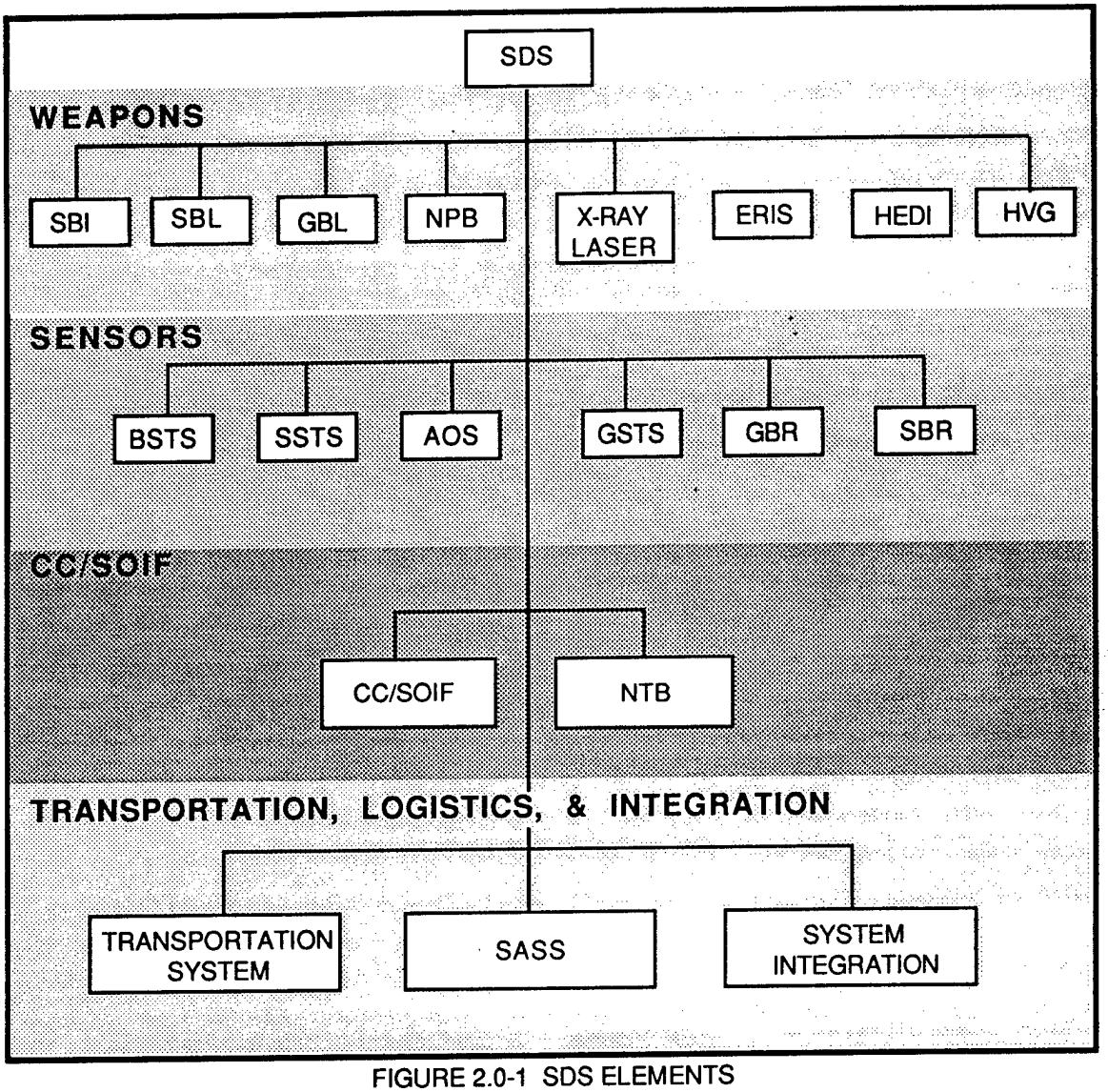


FIGURE 2.0-1 SDS ELEMENTS

3.0 PROGRAM MANAGEMENT ORGANIZATION AND RESPONSIBILITIES

Individual Services and Agencies will be responsible for the management of system-element logistics support. SDIO, Director, SDS Engineering and Support, will coordinate logistics support planning and implementation at the SDS level. The SDIO organization for ILS is shown in Figure 3.0-1.

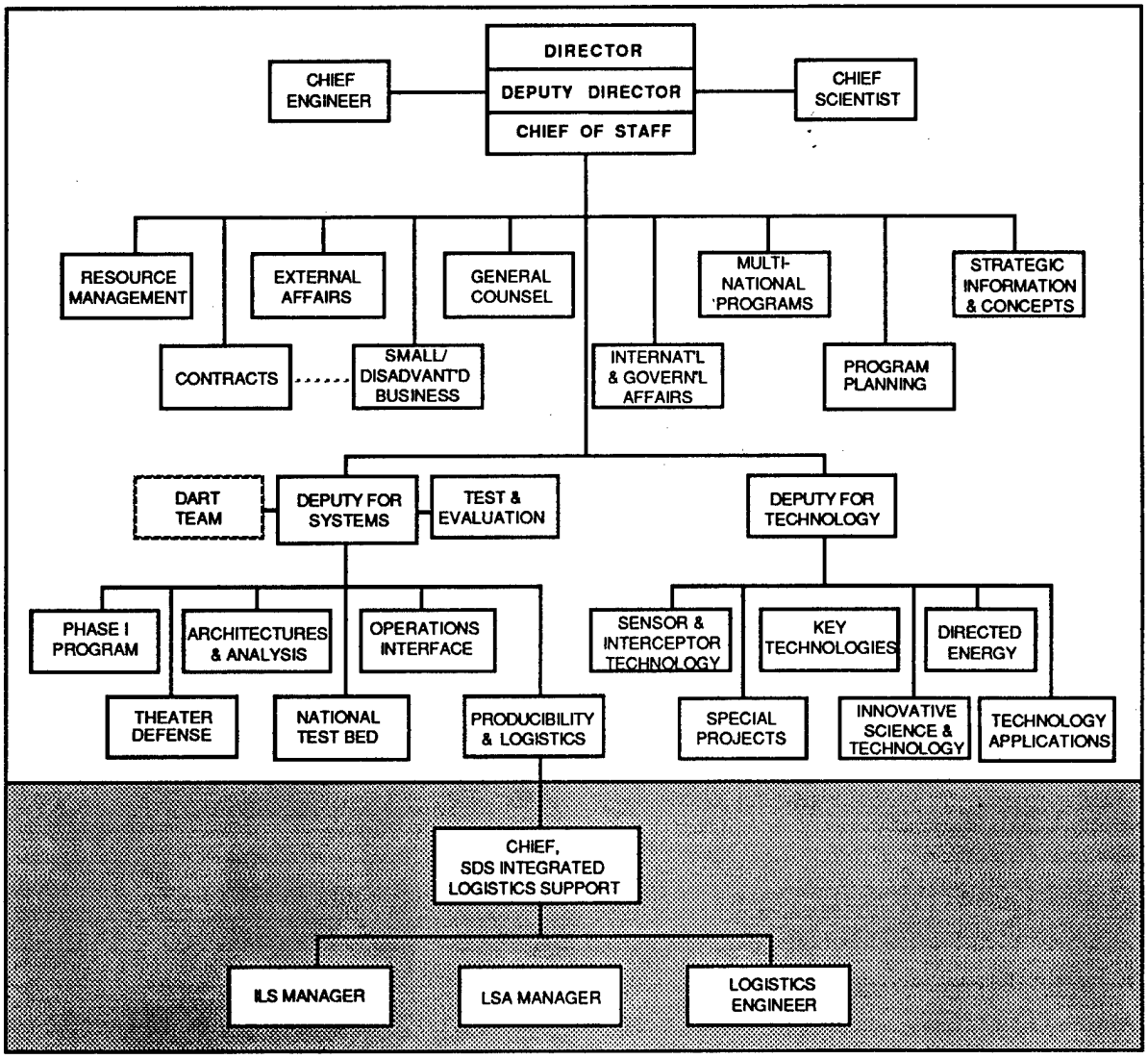
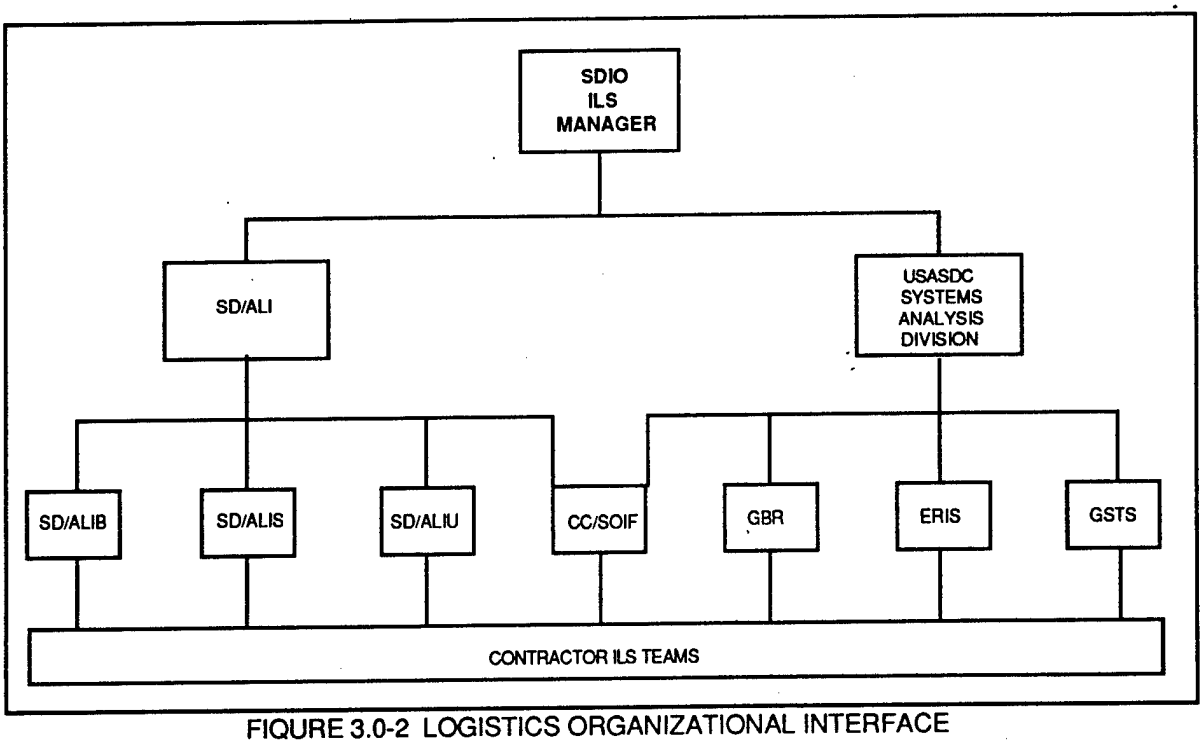


FIGURE 3.0-1 SDIO ILS ORGANIZATION

The SDIO ILS manager is responsible for establishing the system-level ILS goals. The individual project offices supported by their contractor's ILS teams are responsible for ensuring that SDS elements are designed and supported to meet the overall system goals. The individual system-element program offices function through the military service that is responsible for developing that system element. (Figure 3.0-2).



FIQURE 3.0-2 LOGISTICS ORGANIZATIONAL INTERFACE

3.1 Associated Services, Agencies, and Working Groups

The following table depicts those Federal organizations having a responsibility/role in SDS logistics support. This list will be periodically updated.

SDS LOGISTICS ORGANIZATIONS AND POINTS OF CONTACT		
ORGANIZATION/ADDRESS	**Rel/Resp**	**TELEPHONE NO.**
Department of Defense Strategic Defense Initiative Org ATTN: SDIO/S/PL Washington, DC 20301-7100	SDI Programs ILS Management	(202) 693-1826
Office of the Secretary of Defense Office of Test and Evaluation Rm. 1C742 Washington, DC 20301	Operational Test and Evaluation	(202) 694-2520
NTBJPO/DR MS 82 Falcon, AFB, CO 80912-5000	Test and Evaluation	(719) 550-4926
DoD Dir. Def. Research Engr (T&E) Room 3E 1060 The Pentagon Washington, DC 20301-3110	Operational Requirements	(719) 554-2630 (719) 554-3964

SDS LOGISTICS ORGANIZATIONS AND POINTS OF CONTACT (cont'd)		
Joint Chiefs of Staff OJCS/J4/LPD The Pentagon, 2D828 Washington, DC 20301-5000	Logistics Requirements and Policy	202) 697-5464
Joint Chiefs of Staff OJCS/JS (FP&P) The Pentagon Washington, DC 20301	Operational Requirements	(202) 697-6225
USSPACECOM HQ, J4/6L Peterson AFB, CO 80915-5003	Operational Requirements	(719) 554-2630
OASD (P&L) WSIG The Pentagon, 2B322 Washington, DC 20301-5000	Operational Requirements	(202) 697-0051
OASD (A&L) WSIG The Pentagon, 2B322 Washington, DC 20330	Operational Requirements	(202) 697-0051
Logistics Management Institute The Pentagon Bethesda, MD 20817-5886	ILS Policy	(301) 320-2000
Department of the Army U.S. Army Materiel Command AMCDE-AR-P 5001 Eisenhower Ave. Alexandria, VA 22333	Logistics Requirements	(202)-274-5078
U.S. Army Training and Doctrine Command ATCD-G ATCD-FX Ft. Monroe, VA	ILS Policy	(804) 727-2171
U.S. Army Logistics Evaluation Agency ATTN: DALO-LEZ-A New Cumberland Army Depot New Cumberland, PA 17070-5007	ILS Policy	(717) 977-6737
U.S. Army Logistics Center ATTN: ATCL-AQ Ft. Lee, VA 23801-600	ILS Policy	(804) 734-5828 (804) 734-1408

SDS LOGISTICS ORGANIZATIONS AND POINTS OF CONTACT (cont'd)		
U.S. Army Missile Command AMSMI-IL-ME Redstone Arsenal, AL	ILS Policy	(205) 876-7644
U.S. Army Operational Test and Evaluation Agency CSTE-AD-S Falls Church, VA 22041-5115	Test and Evaluation Policy	(202) 756-0430
U.S. Army Air Defense ATSA-CDM-L Artillery School Ft. Bliss, TX	ILS Assistance	(915) 568-5012 (915) 568-3254 (915) 568-6740 (915) 568-6041
U.S. Army Space Institute ATTN: ATZL-SI-CD Ft. Leavenworth, KS	O&O Plans	(913) 684-4395
U.S. Army Strategic Defense Command HQ USASDC-DASD-D P.O. Box 15280 Arlington, VA 22215	Material Developer	(703) 746-0327
U.S. Army Strategic Defense Command HQ USASSDC CSSD-H-SSP P.O. Box 1500 Huntsville, AL 35807	ILS Project Management	(205) 589-5842
U.S. Army Space Command MOS C-OP Peterson AFB, CO	ILS Management	(303) 554-2830
HQ, Department of the Army (LO-PLO) Washington, DC 20301-5023	ILS Policy	TBD
U.S. Army Corps of Engineers	Facilities	TBD
Department of the Navy Naval Space Command N5IT Dahlgren, VA	Operational Test Forces	(703) 663-7591
Department of the Air Force Air Force Systems Command AFSC HQ/PLXI Andrews AFB, MD 20334-5000	CALS Plans	(301) 981-2270

SDS LOGISTICS ORGANIZATIONS AND POINTS OF CONTACT (cont'd)		
Air Force Logistics Command ATTN: HQ AFLC XPXQ Wright-Patterson AFB, OH 45433-5001	ILS Policy Technology	(513) 257-3360
Air Force Acquisition Logistics Center (AFALC/LSX-SDI Coordinator) Wright-Patterson AFB, OH	ILS and Acquisition Management	(513) 255-3372
Air Force Space Command (LKYX) Peterson AFB, CO	System Management	(719) 554-3445
USAF HQ/LEYM The Pentagon Washington, DC 20330-5130	ILS Policy	(202) 697-8775
Space Division HQ ALI P.O. Box 92960 World Way Postal Center Los Angeles, CA 90009-2960	ILS Management	(213) 643-0142
Air Force Electronics Systems Division (ESD/ATSL) Hanscom AFB, MA	ILS Management	(617) 271-4712 (617) 271-4713
AFOTEC HQ/XPS Kirtland AFB, NM 87117-7001	Test and Evaluation	(505) 846-6074
AFWAL/ALS Wright Patterson AFB, OH 45433	Logistics Planning	(513) 255-8205
USAF HQ/LEYYA The Pentagon Washington, DC 20330-5130	ILSPolicy	(202) 697-0311
AGMC/ML Newark AFB, OH 43057-5475	Calibration and Standards	(614) 522-7990
National Aeronautics and Space Administration		
NASA Marshall Space Flight Center Huntsville, AL	TBD	TBD
Department of Commerce		
National Institute of Standards and Technology Gaithersburg, MD	Calibration	(301) 975-2421

TABLE 3.1-1 SDS LOGISTICS ORGANIZATIONS AND POINTS OF CONTACT

4.0 SDS INTEGRATED LOGISTICS SUPPORT MANAGEMENT TEAM (ILSMT)

4.1 Organization

The SDS ILS Chief (figure 3.0-1) will coordinate logistics support at all levels of the SDI Program. This ensures that SDS logistics activities conform to DoD acquisition and support guidelines. It also ensures that the SDS ILS elements are integrated vertically within each system-element, and then horizontally between system-elements when logistics benefits can be derived. The following functions will be accomplished at the SDIO level.

- Formulate SDI logistics policy at the SDI level for approval by proper authority;
- Recommend logistics actions influence system design for supportability and minimize life-cycle costs (LCC);
- Review individual system-element logistics activities in order to identify areas of commonality;
- Perform other logistics and logistics-related functions, and participate in other program activities as required;
- Develop LSA at the top level SDS architecture;
- Ensure integration of specialty engineering with system engineering during SDS integration.

4.2 Procedures

An SDS ILSMT will be established at a later date. Until the time of its establishment, ILSMT functions will be fulfilled in part by various Panels of the SDIO Integrated Support Working Group (ISWG). [See Annex C, ILSMT Charter].

Until the ILSMT is activated, any required modifications to current ISWG procedures will be coordinated through the primary ISWG members. Status reports of action items will be published within 10 working days of a meeting. ILS Panel ISWG Membership will be promulgated separately.

SECTION II

CONCEPTS, GOALS, AND STRATEGY

1.0 INTRODUCTION

This section contains an overview of the system-level concepts for supporting the SDS and a discussion of system support goals, together with an initial strategy for meeting the goals for each ILS element.

This section commences with a brief description of the SDS operational and organizational concept. A note on readiness objectives is followed by the foundation for a logistics acquisition strategy. Next is the outline for the supportability test and evaluation concepts. The section concludes with a discussion of each of the ILS elements from a system-level point of view.

1.1 Operational and Organizational Concept

The SDS will be deployed in an architecture that contains space- and ground-based elements. The ground-based elements will be deployed by conventional techniques currently used by similar systems. Space-based elements will be deployed by an advanced launch system. When the system is deployed, it is the role of the CC/SOIF system to ensure that the weapons and sensors are properly employed in each phase of battle. A battle group, consisting of available weapons platforms, will be assigned to each threat tube. During the boost phase, the BSTS system detects missiles by their plumes and the Command Center performs the human function of mode selection. Enemy missile target data is passed via CC/SOIF to the SSTS system as post boost vehicles (PBV) and reentry vehicles (RV) enter the Post Boost phase. The SSTS system will direct the SBIs to intercept these vehicles. As PBVs and RVs enter the midcourse phase, tracking and battle data is still handled by the SSTS system. In the later midcourse battle management functions are transferred through CC/SOIF to the GSTS sensors and the ERIS interceptors which handle the remainder of the battle.

SDS planning is conducted by the Commander-in-Chief, U.S. Space Command. The Commanding General, U.S. Army Space Command, and the Commander, U.S. Air Force Space Command are planning for ground- and space-based system elements, respectively. Acquisition and logistics management is under the joint purview of the Commanding General, the U.S. Army Strategic Defense Command and Commanding General, Army Materiel Command for ground-based systems. Acquisition and logistics management of the Air Force is under the purview of the Commanders of the U.S. Air Force system Command (Space Division) and Air Force Logistics Command for space-based systems; and the Director, SDIO, for the CC/SOIF system.

1.2 Mission Requirements

SDS mission requirements are to implement a multiphase ballistic missile defense system that will contribute to the denial of Soviet war aims, limits the damage from a strategic ballistic missile attack, and enhances U.S. posture for the deterrence of a confrontation involving ballistic missiles. A more detailed, but classified statement of these mission requirements is given in Joint Chiefs of Staff Memorandum 93-87 (23 June 1987).

1.3 Operational Environment

The SDS system-elements will operate in a broad spectrum of environments. These range from hostile to benign and include ground (fixed and mobile basing and aircraft; U.S. and allied basing) and space (from low-Earth orbit to geosynchronous orbits). Basing climates will vary from tropical to arctic.

1.4 Other Required LSA Input Parameters

LSA input parameter requirements will be determined through the iterative LSA process. Analyses will be conducted with the Services, and will be based on SDS-level support requirements. ILS reviews and action items will provide the means for coordination of system-level LSA decisions and actions.

2.0 SYSTEM READINESS OBJECTIVES

Readiness objectives are currently in the process of being established for SDS. These overall objectives will be driven by the system operational requirements, and will be influenced by the operational functions of the system elements.

The overall SDS readiness objectives (e.g., reliability and availability) will be developed in concert with the system operational requirements, which are being determined by simulations and trade studies. Subsequent to decisions on system-level quantitative readiness measures, an iterative allocation process will commence, with the purpose of assigning individual system-element-level readiness goals. These individual goals will be determined by the following factors:

- The functions the system element performs within SDS;
- The element's degree of functional overlap/backup within SDS;
- The degree of technical risk and complexity associated with the element.

3.0 LOGISTICS ACQUISITION STRATEGY

Required logistics support shall be integral to and acquired concurrently with SDS hardware items. The basic goal of this acquisition strategy is to field a system that is operable and maintainable by the ultimate user in the intended environment, at the lowest achievable cost.

3.1 Contractual Approaches and Incentives for LCC and Reliability and Maintainability (R&M)

TBD

3.2 Supportability Goals

TBD

4.0 SUPPORTABILITY TEST AND EVALUATION (T&E) CONCEPTS

Results of supportability T&E will be used to update this ILSP. This section addresses the major points to be considered during supportability T&E.

4.1 SDIO Policy

During the Demonstration/Validation (DEM/VAL) phase, detailed ILS T&E objectives shall be established. This will be accomplished in conjunction with the Services for the acquisition phases and incorporated within the formal test programs. Test results will be used to assess system-element supportability, support systems adequacy, and the SDS Phase I configuration. Results of supportability assessments will be introduced into the National Test Bed (NTB) structure.

4.2 Test Program

4.2.1 Available Test Plans

Available plans include the SDS Test and Evaluation Master Plan (TEMP), individual Service/system-element TEMPs, and ILSPs.

4.2.2 Government-Contractor Relationships

It is intended that the Government and the various contractors cooperate fully during test and evaluation (T&E) of SDS. The Government will provide program oversight, and the pertinent data and equipment required for studies, test plans, and analyses. Contractors will be responsible for those items which are contractually specified. The following areas, as outlined in the T&E task of the SETA contract, will comprise the major areas in which close Government/contractor cooperation will be required.

I. Testing Planning
   - A. Test and evaluation policies
   - B. Test approach development
   - C. Test plan review
   - D. Test plan development

II. Test Compliance

III. Test Evaluation
   - A. Evaluation
   - B. Validation of test methods
   - C. Evaluate test results

IV. Simulation and Modelling
   - A. Methodology
   - B. Requirements
   - C. Validation
   - D. National Test Bed

V. Test Resources
   A. Facilities/Instrumentation
   B. Targets
   C. Cost estimation
   D. SDIO space and ballistics launches
   E. Environment

VI. T&E Master Database
   A. Definition and requirements
   B. Data gathering
   C. Implementation
   D. T&E master integrated test schedule

VII. General Support
   A. Special investigations and analyses
   B. Liaison coordination and administrative support

4.3 Test Support

As test support requirements are developed, the resources and other support required will be addressed.

4.4 Supportability Test, Evaluation, and Verification (TEV) Goal

The LSA program's goal is to influence system design in order to achieve SDS readiness goals at an affordable LCC.

4.5 Supportability TEV Objectives

To support the goal discussed above and refine this task's scope, these objectives apply:

- Achieve system readiness goals at an affordable LCC;
- Ensure that supportability issues influence SDS design;
- Use existing Service/agency logistics infrastructure;
- Use on-orbit maintenance and upgrade options as applicable;
- Develop SDS software which is testable, maintainable, and can be upgraded in place;
- Ensure fulfillment of contractual requirements.

Testers and evaluators at all levels will support supportability and readiness by:

- Including all support requirements and concepts that apply to the system-element in test programs and plans;

- Testing, evaluating, and verifying the support requirements and concepts in test programs and plans;

- Estimating adequacy of related-design characteristics, manpower, training, logistics concepts, and support resources meeting the prescribed System Readiness Objectives (SRO) after initial fielding;

- Providing system-element program managers with data on similar fielded systems that could influence ILS program requirements;
- Participating in Test Evaluation Working Group (TEWG) and Integrated Support Working Group (ISWG)/ILSMT activities.
- Structuring specific evaluations to provide data for updating program analysis estimates.

4.6 Supportability TEV Considerations

Funding for supportability TEV will be included as part of the element program overall funding. The military services will conduct supportability TEV in conjunction with tests that focus primarily on operational aspects of a system or subsystem. Integral to TEV will be determinations of the adequacy of identified maintenance and support requirements.

4.7 Peculiar Test Requirements

To date, no peculiar test requirements have been identified that will affect supportability TEV.

4.8 Training, Manpower, and Skills

TBD

4.9 Schedule

TBD

4.10 Logistics Support Analysis Record (LSAR) and Test Data Collection Interface

Data collection/reporting systems shall be established in accordance with applicable SDIO guidelines. The systems should fulfill all requirements for collecting, processing, and storing supportability data during testing.

Logistics planning data from the Service/system element Logistics Support Analysis Records (LSAR) will be used as baselines for structuring supportability TEV objectives. Feedback from the test results will be used to update the LSARs. Personnel assigned to the assessment teams must be familiar with the location and availability of LSAR data.

During testing, program managers should ensure supportability assessment data are distributed to meet program requirements.

4.11 Test Locations

See Table 4.11-1.

LOCATION	ELEMENT	DATE
Advanced Research Center, Huntsville, AL	CC/SOIF	TBD
Edwards AFB, CA	SBI	TBD
Vandenberg AFB, CA and Western Test Range	SSTS, GSTS, & ERIS	TBD 1992
National Test Facility Falcon AFB, CO	All	
Cape Canaveral AFS and Eastern Test Range	BSTS, SSTS	TBD
Kennedy Space Center	SSTS	TBD
Eglin AFB, FL	SBI	
Naval Pacific Missile Range Facility, HI **	ERIS	1991
Harry Diamond Laboratories MD and VA	ERIS, CC/SOIF	TBD
Electronic Systems Division Hanscom AFB, MA	CC/SOIF	TBD
Nevada Test Site, NV	SSTS, GSTS, ERIS, CC/SOIF	TBD
Rome Air Development Center Griffis AFB, NY	CC/SOIF	TBD
Kwajalein Missile Atoll Marshall Islands	GSTS, SBI, & ERIS	TBD
Arnold Engineering Development Center Arnold AFS, TN	ERIS, SSTS	TBD

NOTE: * Does not include contractor sites
** Back-up for Vandenberg AFB
Source - Strategic Defense Vol 2. No. 31

TABLE 4.11-1 TEST LOCATIONS*

4.12 Organizational Responsibilities

TBD

4.13 Requirements for a Logistics Demonstration

A detailed logistics demonstration will be integrated into the operational testing of a prototype model of each system element. The demonstration will involve the step-by-step performance of key maintenance operations to ensure they can be performed with the prescribed instructions, skills, test equipment, and repair parts.

4.14 Development Test and Evaluation (DT&E)

DT&E of systems will be conducted by the Services using the principle of a single, integrated development test cycle that demonstrates:

- Design risks have been minimized, the engineering development process is complete, and the system will meet specifications;
- The system's military utility at introduction is adequately estimated.

Analysis will include performance of support items, including newly developed support equipment.

4.14.1 Support Materiel Requirements

TBD

4.14.2 Documentation Requirements

TBD

4.15 Operational Test and Evaluation (OT&E)

System performance during OT&E will be assessed by personnel having similar qualifications to those who will actually maintain, operate, and support the deployed system. The ultimate using commander should participate in the planning and conduct of supportability evaluation.

4.15.1 Support Materiel Requirements

TBD

4.15.2 Documentation Requirements

TBD

4.16 Identification of Specific Test Issues

4.16.1 Critical Supportability TEV Issues

Critical supportability issues are defined as those issues which:

- Affect safety - which is and must remain one of the foremost considerations in all aspects of SDS, including supportability;
- Affect readiness or availability to a predetermined, threshold degree.

Critical test issues have been identified and are included in Paragraph 1, Part III, of the SDS TEMP. This part of the TEMP also addresses logistics supportability as a critical issue and makes reference to the SDS Supportability Assessment Plan (Annex 3 of the TEMP).

4.17 T&E Requirements Necessary to Assess Critical Issues

Supportability TEV requirements have been addressed in Annex A of the SDS Supportability Assessment Plan (Annex 3 of the TEMP).

5.0 INTEGRATED LOGISTICS SUPPORT ELEMENTS

5.1 Supply Support and Provisioning

5.1.1 Concepts

Present guidance indicates the U.S. Army Strategic Defense Command (USASDC) has primary responsibility for ground-based SDI supply support while the U.S. Air Force Space Division SD/AFSC has acquisition responsibilities for space-based assets.

5.1.2 Goals

Supply support goals are to comply with the DoD (including Defense Logistics Agency [DLA] and Military Services) parts control procedures and to encourage parts commonalty throughout the SDS. Preliminary LSA has indicated that some space-based systems can be supported most economically through the use of on-orbit robotic servicers. Supply support goals include:

- Extending on-orbit service life of SDS assets,
- Reducing need for satellite replacement and associated launch costs,
- Reducing total SDS weight to orbit demands during the operations and support (O&S) phase,
- Sustaining required level of operational availability for SDI constellations,
- Achieving lowest LCC for the entire SDS.

5.1.3 Strategy

The strategy of supply support involves forcing commonalty during system design. System-element provisioning guidance conference agendas should include an emphasis on commonalty of parts between system-elements. DLA-developed standard preferred parts lists will be used by the provisioning guidance conference chairmen to determine parts similarities/commonalties among system-elements. System-element program managers will provide Provisioning Parts Lists (PPL) that are in a computer-readable format for screening parts commonalty among system-elements. System-element provisioning guidance conference chairmen must be aware of the similarities between their system-element PPLs and those of other system-elements. Priority will be given to selecting a standard part where cost and technical adequacy are benefitted.

System-element program managers should evaluate the impact of the following areas on their supply support program:

- Manned Mission Supportability
- Basing Concepts
- Space-Based Replenishment
- SDS System-Element Availabilities
- SDS System-Element Design Duty Cycle

- Supportability Requirements Precision
- Disposal

5.2 Packaging, Handling, Storage, and Transportation (PHS&T)

5.2.1 Concepts

PHS&T concepts include cost, location/distance, and duration of transport; shelf-life; weight and volume; environmental requirements; constraints of cargo handling equipment; facilities; special handling requirements; safety; and potential hazards. An additional concept includes analyzing whether the item can be physically moved to its operational location from the production facility.

Lift capacity and ground-processing/payload integration times are factors in determining launch capability. Launch capability will affect the readiness levels at which the space-based systems can be maintained. Current vehicles and procedures do not meet SDS needs. Lift will be required for:

- Initial deployment of element units
- Replacement units
- Orbital replacement units (ORU)
- Space-based support equipment

The transportation function involves movement of personnel and equipment and the means to accomplish that movement. This includes transportation on-orbit and between orbits. Transportation is required during deployment, operations and support, and disposal.

Movement of software and data can be either physical (the movement of storage media) or by electronic means. Additionally, the transportation and storage of substantial quantities of operational and historical SDS data must be considered.

Example: SBI transportation requirements involve both:

- Deployment of assets (manufacturer to the launch site, launch, and orbital insertion);

- Movement of the platform within an orbital ring.

Materiel Movement Plans and considerations described in the paragraphs below should be in ILSPs developed by contractors at the system-element level.

The following are checklist items provided by DA PAM 700-55:

- Anticipated storage
- Environmental storage requirements
- PHS&T tradeoff requirements
- PHS&T risk
- PHS&T assets required at first unit equipped (FUE)
- Projected changes in the PHS system
- PHS&T equipment now in development
- PHS&T test requirements

- PHS&T and associated equipment shipping requirements
- Special care such as removal of sensitive components
- Special containers
- List of publications and standards required for the system element

5.2.2 Goals

The goals of PHS&T planning are to ensure that when items are shipped to the operating location, they arrive undamaged and on time. It involves the development and implementation of a program that will ensure the movement of assets within existing transportation systems whenever possible. The use of existing approaches and equipment will be maximized.

5.2.3 Strategy

Each contractor will include the evaluation and planning in their ILSPs for packaging, handling, and transporting of parts, components, and subsystems to the noted locations for launch, storage, assembly areas, and retrieval and return. Transportation modes will include ground, air, and waterways.

System-element ILS program managers should consider the PHS&T checklists provided above. System-element ILSP writers should refer to these checklists for applicability to their program.

System-element program managers should consider describing the following requirements, responsibilities, and constraints in their PHS&T documentation:

- Strategic and tactical transports,
- User transportation limitations,
- Design or performance mobility tradeoffs,
- Transportability request approval requirements,
- Transportation and transportability tradeoffs,
- Transportation and transportability risks,
- Current transportation and transportability assets and those available at FUE,
- Transportation and transportability in development,
- Changes to transportation and transportability systems,
- Transportation and transportability test requirements,
- Transportation and transportability requirements for shipping the element,
- Loading and unloading configurations,
- Special care such as removal of sensitive components,
- Transportability engineering requirements in LSAR data record J,
- Lifting, loading, and tiedown requirements.

Technical data collection and dissemination at all levels regarding PHS&T should include considerations affecting supply support.

Shipping containers and equipment markings should be as all inclusive as possible, to include a responsible individual at the receiving destination. This will ensure expeditious delivery and eliminate the need for excessive tracing actions to identify warranty conditions, storage limitations, shelf life, disposal of containers, etc.

System-element program managers should evaluate the impact of the following PHS&T areas on their program:

- Payload Integration
- Space-Based PHS&T Standards
- Transportation Mode Limitations/Capabilities
- SDS System-Element Relocation
- Transportation System Mean Time Between Failure (MTBF) and Availability
- Orbital Transfer Vehicle (OTV) and Orbital Maneuver Vehicle (OMV) Support
- Adequate Testing

5.3 Technical Data and Data Management

5.3.1 Concepts

Technical data includes scientific and/or technical information (except computer programs and related software) required to translate system design requirements into discrete engineering and supportability documentation. Technical documentation will be prepared during the development and acquisition process for the system-elements, subsystems, and components as well as the appropriate ILS elements.

Technical data and data management provide recorded information to document system design and develop, produce, operate, and maintain the system hardware. The timely development and distribution of technical data is necessary to conduct operations, training, maintenance, supply, modification, repair, and overhaul of systems and equipment.

Evolving computer-aided acquisition and logistic support (CALS) technology should be evaluated for program management application, especially in translation and transfer functions for associated LSAR and development of technical orders and technical manuals.

5.3.2 Goals

The technical data and data management goals to be achieved at all levels of the SDI Program are:

- Obtain the required technical data,
- Eliminate duplicate technical data requirements,
- Determine technical data custodian and recipients, and
- Determine database functions for technical data.

5.3.3 Strategy

Consideration must be given to the quantity/quality of data required/obtained compared to the cost of acquiring, holding, and distributing the data. The electronic generation, maintenance, storage, and distribution of technical data will be essential for supportability and cost reduction.

Technical data for system elements to be developed include technical manuals for operations, maintenance, service, repair, overhaul, and modification of the SDS systems and subsystems. The SDS LSA/LSAR database will serve as the basis for development of the technical manuals. This database will be available to the system-element program offices who will ensure compatibility among operations and maintenance procedures, task allocation, support

equipment, etc. To ensure that the technical manuals are adequate to operate and maintain the system(s), subsystem(s), components, and support equipment, they will be prepared, validated, and verified in accordance with applicable Service directives and procedures.

SDS technical manuals will be developed in an automated format. The automated technical manuals will consist of a paperless system which consists of computer-aided text, data, and graphics or video disc. Engineering drawings and/or manuscript technical manuals will be used during DEM/VAL, full-scale engineering development (FSED), and operational and supportability testing. The final "hard copy" manuals will be delivered prior to system acceptance by the Services.

Data management procedures will be included as an integral part of the system development and acquisition process. This will ensure that a complete data package is developed for the overall SDS as well as each operational and support element. The responsibility for developing ILS requirements for data management rests with the Deputy Program Manager for Logistics (DPML)/Integrated Logistics Support Manager (ILSM) in the respective SDS program office. The DPML/ILSM will input requirements to the data management officer who will be the focal point for data management, develop the technical data management plan, and ensure that the system-element data requirements are met through comprehensive and timely data calls.

System-element ILS managers should evaluate the impact of the following two technical data areas on their program:

- Data versus hardware representation, and
- Currency of data.

5.4 Training and Training Support (Training Documentation)

5.4.1 Concepts

Training and training support concepts include the processes, procedures, techniques, and equipment used to train SDS military, DoD/Service civilian and contractor personnel to operate, maintain, and otherwise support the SDS. This includes individual and crew/unit training; new equipment training; initial, formal, and on-the-job training; planning for training equipment and devices (including simulators and embedded training devices); and their acquisition, installation, and support.

The basic training concept for SDS will be developed by SDS Training Planning Team to include use of:

- Instructional Systems Development (ISD) to develop training program requirements which will provide integrated training at all levels of the SDS architecture and across system-elements;

- Existing Service training organizations, processes, and facilities;

- LSA-derived requirements for manpower and personnel numbers, skill and skill levels, as well as the timing of the need for trained personnel, and their distribution across the system-elements;

- Simulators for institutional training and job performance aids, simulators, and embedded training for crew/unit and system training;
- The NTB for system training;
- Organization inputs.

5.4.2 Goals

The goal of training and training support planning for SDS is to identify qualitative and quantitative training requirements and to meet these requirements throughout the system's life cycle.

5.4.3 Strategy

System-element ILSPs will summarize training and training support equipment requirements. The ILSPs will include their delivery schedule in the ILSP milestone/key event chart.

To ensure a structured development of SDS training and training support requirements, SDIO will:

- Promote integration of supporting Service and individual system-element training requirements and objectives;
- Develop, coordinate, and disseminate SDS training and training support policy and guidance;
- Monitor Service, SDS, and individual system-element training and training support objectives, requirements documents, plans, and other activities to ensure manpower and personnel requirements are addressed early and continuously in the development of total system requirements;
- Ensure that training and training support requirements development and issues are properly addressed in SDIO Work Package Directives (WPD);
- Encourage the training management staff to participate in the Computer Resources Working Group and ensure that training requirements are included in the Computer Resources Life-Cycle Management Plan (CRLCMP);
- Establish SDIO ILS staff training requirements.

During FSD, an independent review by the component training command and its users must affirm the adequacy of training plans. The SDS training equipment policy requires it to be delivered in time to allow training to take place prior to operational use of the system.

Service organizations responsible for development of SDS training and training support requirements shall be guided by this plan, the Supportability Research Policy for the Strategic Defense Initiative, Service-unique requirements, and the specific requirements of SDIO-generated WPDs. In general, Service training and training support responsibilities focused on their service areas of need and responsibility. These fall into the following areas:

- Provide training and training support management direction, planning, oversight and support of SDS system-element programs under their purview in accordance with DoD and Service-specific directives.

- Function as the principal management feedback link between their SDS system-element programs and SDI technology programs.

- Conduct those training and training support activities necessary to meet requirements.

- Provide SDS ILS staff training requirements as appropriate.

In general, SDIO policy requires system-element Program Management Offices (PMO) be responsible for development of training and training support requirements for their system. PMOs shall be guided by this policy, Service-unique requirements, and the specific requirements of SDIO-generated WPDs. To develop SDS system-element training and training support requirements, the PMO will:

- Develop explicit and visible plans, adequate resources, and contract requirements for:

  - Instructional System Development (ISD);

  - Detailed analyses and tradeoffs of training and training resource requirements with design R&M, manpower quantities, skill and aptitude requirements, energy, and other support requirements to meet program goals;

  - Development of training, training support, training equipment and devices;

  - T&E of the adequacy of planned training and training support concepts and resources;

  - Post-deployment review, evaluation, and analysis of training in relation to system readiness and sustainability objectives;

  - Establishment of a training planning team, preparation of a training development plan to define and document all training requirements, definition of preoperational, operational, and maintenance training requirements to support T&E and deployment requirements.

- Provide feedback to SDIO on issues relating to training and training support requirements, development, and any problems/facts necessary for management decisions, coordination, and integration.

- Use and direct contractor use of Service-approved training and training support analysis tools (e.g., HARDMAN [Hardware versus Manpower], MANPRINT [Manpower and Personnel Integration], Cost and Training Effectiveness Analysis [CTEA], ISD).

- Provide contractors with clear descriptions of user personnel qualifications and current training programs for comparable systems to be used in prime hardware/software training system design and development.

- Analyze the sensitivity of training and training support requirements and constraints on system design parameters and associated impacts on system readiness and sustainability. Identify risk areas.

- Reduce risks by using:

  - Operation and maintenance tasks identified through LSA in comprehensive training program development systems (e.g., ISD);

  - Computer-aided techniques for configuration control to ensure consistency between training materials and equipment and the systems they support;

  - On-the-job training capabilities incorporated in the prime equipment design as a method of reducing the need for additional training equipment.

- Ensure that design development and training personnel requirements, as well as training equipment requirements, complement and are developed in concert with each other.

- Develop realistic training and training support requirements for their programs and present them along with supporting rationale.

- Require the training management staff to participate in the Computer Resources Working Group (CRWG) and ensure that training requirements are included in the CRLCMP.

- Ensure contractual documentation contains all training and training equipment requirements.

- Establish ILS staff training requirements.

- Initiate Service and contractor training; conduct follow-on crew and support personnel training; identify, quantify, and program or acquire all support elements needed to maintain crew and maintenance training equipment and simulators including spares, technical data, contractor support, etc.

Responsibilities include those promulgated by the system-element PMO to respective contractors. Contractors shall: Identify, analyze, and develop training and training support requirements and produce training systems materials, equipment, job-performance aids and devices in accordance with the terms of their contract. To maximize effectiveness and improve the affordability of training and training support, contractors are encouraged to develop innovative, well thought-out, and defensible approaches and concepts. As a minimum, these will consider:

- The risks and impacts of not achieving desired results from new training and training support technologies;

- The impacts on acquisition costs, operation and support costs, and force structure.

System-element ILSPs will identify and describe initial supervisory, operator, maintenance, and other support courses of instruction/training programs available to provide/complement the skills identified in their manpower and personnel sections. ILSPs will also identify:

- Funding and contracting responsibilities;
- The organization, agency, or contractor responsible for the conduct of initial training courses;
- Training plan and schedule.

System-element program managers should evaluate their program's training and training support requirements in support of these goals to maximize their effectiveness in supporting developmental, deployment, and fielded system training requirements. Managers should also evaluate the economies of training and training support impacts through acquisition and use of training simulators/devices.

System-element ILSPs will identify the training and training support subsystem required to be on-hand for development test and evaluation (DT&E) and operational test and evaluation (OT&E). The ILSPs will indicate whether training of test personnel will occur before or during OT&E.

5.5 Facilities

5.5.1 Concepts

All facilities planning activities are directed toward ensuring that all required permanent or semi-permanent operating and support facilities (e.g., training, maintenance, storage, operational, and testing facilities) are available concurrently with the deployed hardware. This includes the need for new construction as well as modifications to existing facilities. The feasibility of using existing facilities versus acquiring new facilities at some point in the future must be analyzed to determine long-range planning for military construction for the acquisition of new facilities. Planning must include consideration of construction funding cycles, real estate requirements, siting analyses, environmental impacts, safety and health standard requirements, and security restrictions.

Operational and support facilities are of particular concern to SDS, not only for ground-based elements, but also for space-based elements which also require extensive ground support facilities. Not only are the facility requirements for a single element important, but also the facility requirements for the total number of elements to be deployed. Tradeoffs between space-based assets versus ground-based assets must take into account the total facility requirements for each alternative, including its environmental and political implications. Requirements for expanded and new operational facilities must also include support requirements, such as maintenance facilities, supply support facilities, housing for operational personnel, training facilities, and other related support facilities. These factors all contribute to the life-cycle cost of the system and must be included early in the budget process to ensure availability in time to support deployment.

Facilities have an inherent requirement for form, fit, and function compatible with the form, fit, and function of the system-element/component/subsystem. This is especially true when size and access for maintenance activities is considered.

5.5.2 Goals

The goal of facilities planning is to ensure that all facilities are available to the operating elements and supporting activities in a timely manner.

5.5.3 Strategy

Program managers must investigate alternate facilities concepts because facilities represent a significant portion of the LCC. System-element program managers should evaluate the impact of the following facility areas on their program:

- Launch Support Facilities
- Space-Based Facilities
- Launch Facility Standards

System-element facility plans should include a description of the site requirements, responsibilities, and constraints. Planning should include the following:

- Site preparation/adequacy;
- Maintenance, calibration, storage, and training requirements;
- Special utility requirements/energy conservation;
- New facility requirements;
- Adequacy (inadequacy) of existing facilities for system operational and maintenance needs;
- Modification of existing facilities;
- Military Construction Authority (MCA) program requirements;
- Special security requirements;
- Advance funding requirements for new or modified facilities;
- Provision of U.S. or host nation facilities.

The LSAR database will be used to provide an audit trail for specific facilities requirements.

5.6 Manpower and Personnel (M&P)

5.6.1 Concepts

M&P involves the identification and acquisition of the requisite number of personnel who possess the skills and skill levels required to operate and sustain SDS over its lifetime.

Manpower requirements are the positions and related skill/skill-level descriptions that have to be filled to properly operate and support a system. Personnel requirements are the numbers and kinds of trained and skilled people needed in the force structure to meet the manpower requirements.

The SDS could have a requirement for a large number of highly skilled people to operate, maintain, and otherwise support its technologically sophisticated systems and a smaller available labor pool over the next 15 to 20 years. This has caused the DoD and SDIO to elevate manpower and personnel considerations in all phases of the SDS development process, particularly in early planning.

The introduction of new, advanced, and complex technologies could require more operators and maintainers with greater ranges of skills and higher skill levels than either predecessor systems or initial M&P analyses have indicated. Therefore, all M&P analyses must consider the impact of technology on initial system and individual system-element M&P requirements.

5.6.1.1 Manpower Requirements

Manpower requirements must be based on related ILS elements factors as well as human factors engineering which will be applied to ensure optimal man-machine interfaces. Manpower concepts will be predicated on accomplishing operational and support missions in the most effective and economical manner achievable within existing personnel constraints.

For space elements, the SDS Phase I concept excludes manned space assets and manned support in space. Therefore, manpower and personnel requirements will be developed only for ground-based elements and the ground-based components of space-based elements and CC/SOIF.

5.6.1.2 Personnel Requirements

Personnel requirements are based on SDS manpower requirements, broken out by individual Service and system-element. Requirements must take into account people over and above the manpower positions needed to make up for attrition, loss, and pipeline overhead.

5.6.1.3 Training Requirements

SDS training requirements are a function of manpower and personnel. SDS training requirements are found in the preceding section (training and training support).

5.6.1.4 Personnel

System-element ILSPs will present personnel specialities and skill levels that should be assigned to perform operational, hardware/software maintenance, and other support tasks on SDS and related equipment, subsystems, or systems for their respective installation(s) by:

- Army MOS and numbers
- Navy NEC and numbers
- Air Force AFSC and numbers
- Marine Corps MOS and numbers
- Civilian Occupation Skills and numbers

5.6.1.5 Man/Equipment Ratios

In their ILS plans, individual system-element program managers will state the applicable maintenance man-hour standards, the basis for use, and source(s) of data used to develop the standards. Standards will be calculated and established based upon the most reliable source of data (e.g., yearly maintenance man-hours, Reliability, Availability and Maintainability (RAM) studies, manufacturer's data) for each operating system/equipment.

5.6.1.6 Manpower and Personnel Changes

Preliminary manpower documents provided by the PMOs will identify either increases or decreases in all manpower categories caused by the installation and subsequent operation of the system-elements, subsystems, and equipment.

Total system-element manpower and personnel increases or decreases will be reported to SDIO annually by individual system-elements, along with an explanation of the cause. Incremental increases amounting to a 2 percent change in system-element total manpower or 5 percent change in personnel requirements. These changes may also cause the system-element to breach its manpower or personnel threshold. If this occurs, it will be reported immediately to SDIO, along with the cause(s) and course of action that will be taken to eliminate the increase.

5.6.2 Goals

The High Payback Guidelines Annex from the Supportability Research Policy for SDI requires manning of SDS element designs must be considered early and explicitly stated throughout the design and technology development and verification process. The goal of M&P planning is to ensure that manpower requirements are developed and personnel assignments are made to meet mission operation and support demands throughout the life cycle of the system.

Key SDIO manpower and personnel goals are:

- Identify total element quantitative and qualitative manpower and personnel requirements.
- Ensure minimal changes to the DoD and individual Service force structures for operation and support of SDS through realistic use of military, DoD/Service civilian, and contractor personnel.

5.6.3 Strategy

5.6.3.1 M&P Requirements

To ensure a structured development of SDS M&P requirements, SDIO will:

- Exercise coordination, issue resolution, and integration of supporting Service and individual system-element M&P requirements and objectives. Develop, coordinate, and disseminate SDS M&P policy and guidance as required.

Review and monitor Service SDS and individual system-element M&P objectives, requirements documents, plans, and other activities to ensure M&P requirements are addressed early and continuously in the development of total system requirements.

- Ensure that M&P requirements development and issues are properly addressed in SDIO-generated WPDs and reflect SDIO priorities for minimizing manpower quantities or skill requirements.

- Establish SDIO ILS staff manpower requirements.

5.6.3.1.1 Military Service-Level Requirements

Service M&P requirements are similar to those of SDIO at the system level, but focus is on Service areas of responsibility. These fall into the following areas:

- Providing M&P management direction, planning, oversight, and integration of all SDS system-element programs under their purview in accordance with SDIO and Service-specific directives.

- Identifying sources for component personnel.

- Using operator/maintainer requirements.

- Functioning as the principal management feedback link between their SDS system-element programs and SDI programs.

- Conducting those M&P activities necessary for proper accomplishment of the requirements of assigned SDIO-generated WPDs assigned to them.

- Conducting LSA to provide an audit trail for M&P requirements.

5.6.3.1.2 System-Element Applications/Considerations

System-element PMOs and training organizations shall be responsible for development of M&P requirements for their system-element. To develop SDS system-element M&P requirements, the PMOs will ensure that the following have been provided:

- Develop explicit and viable plans, adequate resources and contract requirements for:

  - Detailed analyses and tradeoffs of design R&M, manpower quantities, skill and aptitude requirements, training resources, energy, and other support requirements to meet program goals;

  - T&E of the adequacy of planned manpower and personnel support concepts and resources;

  - Post-deployment review, evaluation, and analysis of manpower in relation to system readiness and sustainability objectives.

- Develop realistic M&P requirements for their system-element and present them in a preliminary manpower document along with supporting analyses and rationale.

- Ensure personnel requirements can be met from DoD component projections.

- Support system-level development of M&P requirements by providing early and updated M&P requirement assessments and rational that show the best, worst, and most probable cases. Provide SDIO and appropriate Service organizations with feedback on M&P requirements development.

- Ensure M&P consideration on the system-element CCB.

- Use and direct the use of contractors' Service-approved M&P analysis tools (e.g., HARDMAN, MANPRINT) or a formal system requirements process such as contained in SAMSO-STD 77-6.

- Ensure contractual documentation reflects the required priority for containing/reducing manpower quantities and skill requirements.

- Provide contractors with detailed descriptions of current and projected manpower, skill, and training resources. Information provided will include specific data on current operator and maintainer performance (including error rates) and realistic personnel cost for fielded systems similar to the proposed system.

- Develop realistic manpower costs for use in tradeoffs. Data will include the personnel costs of filling manpower requirements, as well as any additional costs for replacing or adding experienced technicians if necessary.

- Conduct tradeoffs among system design characteristics, manpower numbers, skills and aptitude levels, and support concepts to meet peacetime readiness and wartime employment and sustainability objectives.

- Analyze the sensitivity of M&P requirements, constraints, and associated impacts on system design parameters and on system readiness and sustainability. Identify risk areas and options.

Responsibilities include those promulgated by the system-element program management office to their respective contractors. Contractors shall identify, analyze, and develop M&P requirements in accordance with the terms of their statement of work and applicable specified directives. To minimize optimal M&P requirements, contractors are encouraged to develop innovative, well thought out, and defensible approaches and concepts. As a minimum they will consider:

- The M&P risks and impacts of not achieving desired results from new manpower reducing technologies;

- Projected availability of required personnel;

- The impact on acquisition costs, operation and support costs, and force structure.

5.7 Computer Resource Support

5.7.1 Concepts

A Computer Resources Supportability Panel (CRSP) has been established under auspices of the Integrated Support Working Group (ISWG) to address all software and associated hardware support issues. The first major product of this group will be an SDIO Supportability Master Plan which will establish a consistent computer resource support concept for all SDIO programs.

SDIO is currently in the process of finalizing an SDS Software Policy, which provides guidance for the SDIO, supporting commands and program elements. It states in general terms the SDS software requirements. This policy is restricted to identifying requirements for software engineering practices and contains guidelines for the implementation of Ada as the standard programming language for SDS and for the use of DOD-STD-2167A as the documentation standard. The SDS full-scale development software is to be developed in accordance with the SDS Software Policy/Management Directive NO. 7, DOD-STD-2167A and 2168, and the SDS Mission Critical Computer Resources (MCCR) Life-Cycle Management Plan.

A major software element of the SDS Phase I effort will be the CC/SOIF. The CC/SOIF element can be thought of as the "SDS Operating System." Additional "peripheral" software elements will be the SDS weapon, sensor, and support systems. An SDS software baseline has not yet been established.

Until the CRSP develops its support concepts, the basic policies and control requirements for on-site maintenance of the SDS computer programs must be addressed at all levels by the element managers. Additionally, a previous logistics study identifies hardware and software maintenance alternatives that need to be evaluated as additional information is gained. Support decisions should be made in coordination with the CRSP to prevent large disconnects later.

It is SDIO policy that all SDS firmware will be developed, tested, and documented like software. All facilities and resources required for firmware development, test, and review need to be addressed by the element program managers in accordance with the SDS Software Policy and the Software Configuration Management Plan (SCMP). Embedded software equipment requirements, storage media, unprogrammed integrated circuit (IC) sources, and newly programmed IC certification must be addressed in accordance with DoD/Service policies and be consistent with the SDIO support concept.

5.7.2 Goals

The goals of the computer resource support panel of the ISWG are to realize the objectives of the ILSP, namely:

- Meet the SDS Mission requirements as they pertain to architecture, modeling and mission assessments; tools; standards; and means of planning, review, and monitoring of design, development, and supportability issues.

- Meet the software technological challenges of the SDS mission in such a way as to ensure that acceptable performance, reliability, flexibility, adaptability,

and survivability are provided in the design, implementation, and support of the software subsystems.

- Coordinate SDS software activities throughout the SDS community with the purpose of minimizing duplication of efforts.

- Promote the concept of shared software resources, knowledge, and accomplishments through the use of previous, and/or concurrently developed and proven methods, technology, and software modules.

5.7.3 Strategy

A unique relationship that must be recognized to properly address the strategy of computer resources for the SDI is that of the SDIO and the SDS. The SDIO is an organizational entity charged with the responsibility of developing policies and plans which could ultimately result in development of SDS. The SDS, therefore, would become a product of SDIO's efforts. To this end, the SDIO has been organized into a Systems, and Technology Division. The primary SDS efforts fall within the Systems Division, which has a Directorate responsible for the Phase 1 portion of the SDS and a Directorate responsible for Engineering and Support of the completed system.

The Phase 1 Program Manager has assumed responsibility for computer resources efforts as they relate to the Phase 1 efforts and, as such, has designated a Software Manager within the CC/SOIF Section to be the executing agent for the SDS Software Management Program. This software manager is to be responsible for planning, guiding, controlling, and monitoring of SDS software development, maintenance, and management. A Computer Resources Working Group (CRWG) charter is being developed to assist him in these efforts. The CRWG will consist of representatives from the implementing, supporting, and using organizations and agencies with responsibility to:

- Identify and coordinate resolution of Mission Critical Computer Resources (MCCR) issues; advise Program Managers, SDS Phase I Element Managers, and System Directors; write and update SDS Computer Resources Life-Cycle Management Plan (MCCR Plan).

- Recommend and coordinate SDS element level software support concepts.

- Monitor compliance with MCCR policies, plans, procedures, and standards.

- Integrate software test activities with the overall test program.

- Maintain a library of MCCR technical and policy related documentation.

It is anticipated that a realignment of functions will elevate the CRWG level of influence to encompass all SDIO computer resource-related activities, thereby broadening the scope of CRWG responsibilities. Expanded CRWG activities are expected to include supportability, configuration management, interface control, validation and verification functions.

It is also anticipated that the activities of the previously mentioned CRSP will be monitored by the CRWG. One of the first major outputs of the CRSP will be the SDIO Software Supportability Master Plan, now being drafted, in which Software support is being addressed.

A Software Policy Waivers Committee (SPWC) will be created as a subset of the CRWG to assist the SDS Phase 1 Program Office promulgation of SDIO Software Policy, thereby ensuring that SDS Phase 1 software meets requirements pertaining to reliability, security, portability, interoperability, usability, and maintainability. The Chairman, SPWC, is to be designated as the Software Policy Control Officer (SPCO) and as such shall provide centralized processing and control of waivers within the SDIO.

The method of distribution of basic programs and of updates to the software will be identified by the Configuration Management Office (CMO) within the SDIO SDS Engineering and Support Directorate. This is currently being evaluated and will be integrated into the SDS Configuration Management Plan (CMP).

SCMP will be included in the Software Development Plan (SDP) to be delivered with the development proposals. These plans will describe the organizations responsible for software configuration management and procedures to identify and control software changes. The SCMP provides the Government with insight into the procedures of the organizations responsible for performing configuration management. The contractor will ensure that the baseline documents comply with contract requirements. Once approved, the documents will serve as baselines for control changes. The contractor representative will be a permanent member of any Government software configuration review/control board. The representative will review all proposed changes and will provide the board with an assessment of adherence to the quality assurance standards for the proposed change and/or proposed configuration. The proposed action for completeness and quality assurance provisions will also be evaluated.

The SDS CMP contains general procedures that apply to both the SDS hardware and software. Due to the highly complex nature of the software and the new technologies that are being proposed, a separate SDIO SCMP is needed. Procedures for ensuring superseded software programs are protected until approval for destruction has been received from the software life-cycle support authority will be addressed in the SCMP.

Configuration management of the evolving SDS and its baseline documentation at the system level will be controlled by a configuration control board established and chaired by the Phase I Program Manager. The System Configuration Control Board (SCCB) will manage the system-level configuration of the SDS and the interfaces between elements. The SCCB will be supported by an Interface Control Working Group (ICWG).

The ICWG will be responsible for identifying, documenting, and coordinating all SDS technical interfaces that do not lie wholly within the design responsibility of a system-element development organization. The ICWG charter is currently being developed.

Program-level configuration management of the system-elements will be established and maintained by Service or agency implementing activities in accordance with existing procedures. The CMO will be established by and within the SDIO SDS Engineering and Support Directorate. During the development period, the responsibility for executing the configuration management function will rest with the contractor. Procedures to implement software configuration control will conform to DOD-STD-2167A and be incorporated in the SDP. The following documents will be placed under configuration control prior to delivery:

- The Software Development Plan (SDP),
- The System/Segment Design Document (SSDD),

- The preliminary Software Requirements Specification (SRS) for each Computer Software Configuration Item (CSCI),

- The preliminary Interface Requirements Specification (IRS).

During transition, functions of configuration management, including configuration, identification, control, and status accounting will be accomplished in accordance with MIL-STD-482, 483, 490, 1521, and DOD-STD-480.

SDS software must be open to adaptation, enhancement, upgrading, and repair over a 5-year full-scale development period and a 10-year operational period. Contractual documentation will specify acceptability criteria for the proposed testing strategy and metrics.

Change control procedures will be imposed on the contractors. The SCCB will be the final authority on change control decisions. The SCCB will ensure that all CSCI changes are properly coordinated in accordance with agreements between the commands involved. The SCCB will ensure the identification of all changes to system documentation and effects on equipment and computer programs associated with a change. The contractor representative will periodically review the configuration management status accounting documents to ensure that all proposed or approved changes are tracked to provide traceability throughout the software development life cycle.

System-element program managers should evaluate the impact of the following computer resources areas on their program:

- Adaptation of DoD-STD-2167 for system operability
- System-element software
- System-element software upload verification
- Software version control
- Data processing hardware standardization

Software standardization testing of the SDS software will follow the procedures outlined in the TEMP and supporting test documentation. Formal testing will be conducted by an independent contractor to ensure proper testing of newly developed software. The use of an independent validation and verification (IV&V) contractor provides a second source of technically competent personnel to ensure that software requirements are satisfied. The requirements for IV&V activities will be specified in the Software Annex of the SDS TEMP.

The Software Annex of the SDS TEMP identifies a test specification language, a standard testing strategy, and standard metrics for quantifying software quality attributes. Developers will define the testing strategy used for detecting errors in requirements, designs, and code, and the various metrics used to predict, estimate, and evaluate critical software quality attributes at each software development stage.

5.8 Maintenance Planning

5.8.1 Concepts

This section addresses SDS maintenance planning requirements at the SDIO level. Maintenance planning is the function by which the applicability and scope of each of the other logistics elements is initially determined. Consequently, the effectiveness of SDS support will depend upon an early, rigorous maintenance planning effort by each of the Services and their

constituent system elements. As the operational phase approaches for each system-element, it will become especially critical that most of the planning be complete.

The development of the maintenance concept for SDS and its elements must go hand-in-hand with the development of the architecture and design of the system. For space-based elements, the architecture and design will vary depending upon whether on-orbit maintenance and servicing will be performed by man, machine, or not at all. The degree of maintenance ranging from simple replacement (pull out - plug in) of ORUs and external attachment of servicing lines to more complex repair and service functions will likewise have a major impact on system architecture and design. For ground-based assets, these considerations must also be incorporated early in the design process for improved supportability and lower LCC.

The principal tool for SDS maintenance planning will be the tailored application of MIL-STD-1388-1A/2A (LSA/LSAR). Planners shall consider the impact of various support alternatives upon their portion of the program. Examples of the issues that should be examined in the process of formulating a maintenance concept are:

- Operational readiness goals
- Automation versus manual task performance
- Effects of modularity
- Levels of maintenance (e.g., two-level versus three-level)
- Survivability
- Nuclear hardening

SDS maintenance is planned around a concept to optimize SDS-level cost and meet readiness goals. In view of constrained funding, this may mean that the support system for each system-element may not be individually optimized, but instead structured to contribute most effectively to the overall SDS requirements.

Maintenance planning will start with the operational requirement for each respective system element, and will consider the following:

- System use
- Availability
- Reliability
- Maintainability
- System safety
- Funding
- Problem areas
- Risk areas
- Use of existing support systems
- Documentation
- Standardization in all possible areas

Additionally, the following specific areas should be examined in detail, as applicable to the particular system element:

- Ground-based maintenance planning
- Space-based maintenance planning
- Optics servicing
- Modular software replacement
- Cryogenics

- Adoption of MIL-M-38793 (Preparation of Calibration Procedures) and MIL-STD-45662 (Calibration Systems Requirements)
- Use of NSA SPEC 74-7 for calibration and alignment

5.8.2 Goals

The primary goal of SDS maintenance planning will be to establish an effective support system at the lowest LCC. Communications will be structured to ensure that logistics managers are kept aware of the progress and best points of individual maintenance planning efforts. One method of maintaining communications will be through periodic meetings (ILSMTs or other appropriate forums) with representation from Services/Agencies. The individual system-elements will be in widely varying environments, with differing support requirements. However, commonalties among the emerging support systems can be exploited to gain higher readiness at a lower cost. Each Service logistics manager should establish a failure reporting/feedback system which will highlight logistics element inadequacies, so that immediate corrective action may be taken.

5.8.3 Strategy

The SDS maintenance concepts will be developed through use of an iterative approach. It will link commonalties among the individual system element concepts, with the aim of enhancing support for the entire SDS. Among the items which must be carefully considered in individual maintenance concepts are:

- Repair policies (i.e., repair/throwaway/level of repair for components)
- Estimated corrective and preventive maintenance requirements
- Levels of maintenance (e.g., three-level: organizational, intermediate, and depot)

5.8.3.1 Maintenance Actions and Support

The following recommendations should be adopted:

- Each Service and program element has its own specified documentation requirements. Opportunities for common documentation which would benefit the support efforts of several system elements should be considered by each program office.

- Certain segments of the CC/SOIF system conceivably could be used for communicating support information. This would include such data as failure reports, analysis data, and supply status.

- A reliability centered maintenance process, or a suitable alternative, should be used for determining system-element maintenance requirements.

5.8.3.2 Repair Criteria

Repair criteria should be derived from a systematic level-of-repair analysis, based upon cost, criticality, and other applicable criteria.

5.8.3.3 Maintenance Tasks

Maintenance tasks will be defined as a result of the LSA process. This particular area should benefit from the exchange of maintenance planning information among the system-element managers. In some cases, candidates for standardization or for combining support resources may arise.

5.8.3.4 Depot Maintenance Personnel Requirements

A major decision will be whether depot maintenance will be performed by DoD personnel or contractors. This decision should be based on trade studies and cost benefit and analyses. For security reasons, overhaul of cryptographic components probably will be performed only by DoD employees. Depot maintenance interservicing shall be determined and established in accordance with DoD directives.

5.8.3.5 Interim Contractor Support

Interim contractor support (ICS) almost certainly will be required during the initial phases of the program. However, contractor support can become very expensive if not judiciously utilized. Accordingly, the amount and specific use of contractor support must be determined through comprehensive trade studies. Contractor support may be the most cost-effective approach for some of the system elements.

5.8.3.6 Site Activation Actions and Support

Activation of sites should be accompanied by thorough analysis and planning to combine system-element requirements and to provide only the support required for mission accomplishment. Where practicable, new maintenance sites should be colocated with, or adjacent to, operational sites to take advantage of existing facilities. Maintenance activation should be planned during FSD.

5.8.3.7 Program Management Office Strategy Considerations

Program Management Offices should:

- Develop maintenance requirements documents that include constraints as well as maintenance requirements.
- Define actions required to maintain their individual system-element.
- Determine and publish maintenance functions to be performed, based on readiness requirements.
- Provide a quantifiable basis for the identification and description of tools, test equipment, personnel, spares, and repair parts and facilities to support their individual system element.

5.8.3.8 Validation and Verification Requirements

System-element program managers should evaluate the impact of the following maintenance planning areas on their program:

- Ground-based SDS maintenance planning
- Space-based maintenance plan standards
- Optics servicing
- Modular software replacement approach
- Cryogenics
- Adoption of MIL-M-38793 and MIL-STD-45662
- NSA SPEC 74-7 for calibration and alignment

5.9 Support Equipment

5.9.1 Concepts

Support equipment is defined as all equipment (mobile or fixed) required to support the operation and maintenance of a materiel system. This includes associated multi-user end items, ground handling and maintenance equipment, tools, metrology and calibration equipment, communications resources, and test equipment and automatic test equipment (ATE). It also includes the acquisition of logistics support for the support and test equipment vehicles for transporting and servicing the system, power generators, and environmental control units.

Off-the-shelf test, measurement, and diagnostic equipment (TMDE) and support equipment may offer a lower LCC than specially designed equipment. The feasibility and cost of Government rights should be examined for any off-the-shelf equipment procured. Unique support equipment will be required for the on-orbit maintenance requirement. For example, on-orbit transfer of fluids will stress support equipment designs.

Support equipment design is driven by prime equipment requirements. Commonalty of support equipment will be unlikely in all but a few instances. Those cases with potential for standardization will be investigated by the Support Equipment Subcommittee of the ILSMT. Even though entire support equipment items may not be standardized, there may be opportunities for standardization of certain aspects/components, with a resulting increase in effectiveness and savings to the Government. ATE and TMDE have potential for standardization across system elements. This equipment should be as simple and unsophisticated as possible.

5.9.2 Goals

The goals of support equipment planning are to:

- Ensure that the required support and test equipment is available to the operating bases and the supporting maintenance activities in a timely manner.
- Maximize use of common tools and avoid the proliferation of support equipment by variety and types.

- Ensure that support equipment is available to individual system-elements and support activities when needed.

5.9.3 Strategy

Individual support equipment requirements will be determined through separate system-element LSA efforts. Early attention must be given to identification and subsequent acquisition of support equipment, with existing support equipment used where practicable and cost effective. System element PMOs should evaluate the impact of the following support equipment areas on their program:

- Space-Based Support Equipment
- Space-Based Support Equipment Standards
- Fluid and Fuel Space Transfer Systems

The Services shall be responsible for determining their respective support equipment requirements. SDIO will provide coordination and information exchange so that potential support equipment commonalties may be identified across system elements. This will be accomplished through the Support Equipment Subcommittee of the ILSMT. The Services will acquire support equipment in accordance with existing Service guidelines. Software changes shall be fully controlled by a designated CCB, at either the Service level or at the SDIO level for multi-Service-use equipment.

Each system element will develop specific plans to obtain the required TMDE. Ample time should be allotted for test program set development. Calibration and calibration support should be provided by the calibration activity of the host base. This may be done on-site or in the calibration activity, in accordance with local regulations/agreements.

During the test and evaluation periods, support equipment will be a central item in supportability assessments. Support equipment shall be thoroughly evaluated for the following:

- The performance and suitability of the support equipment;
- The effectiveness of the support equipment in maintaining the prime equipment.

Built-in test (BIT) capability will increase the complexity and cost of support equipment. Therefore, it should be incorporated into support equipment only after a thorough benefit analysis.

5.10 Design Influence Interface

5.10.1 Concepts

The primary objective of considering logistics during the design phase is to produce a system that can be supported at a minimized cost. Design for support can drastically reduce LCC by increasing accessibility, ease of maintenance, durability, and transportability. The earlier in the design process that support requirements are incorporated, the greater the potential savings in

LCC. Anticipating and designing to reduce the logistics requirements before and after deployment will result in an economical and effective system.

Standardized selection of materiel from the component to the subsystem level should be used where practical and possible. Extensive standardization will reduce requirements for spare parts and training and their associated costs, allow far reaching improvement programs, and reduce LCC. The following subsystems and components are prime candidates for standardization:

- Fasteners
- Communications and Cryptographic Equipment
- Guidance and Control
- Cryogenics
- Maneuvering Systems
- Fuel Systems
- Materials and finishes
- TMDE
- Material Handling Equipment (MHE)
- Lift /Grip Devices
- Electronics

The use of standard fasteners and other features to reduce the need for special and a wide variety of tools and test equipment should be considered to enhance support of SDS and its components. Built-in test (BIT) and built-in test equipment (BITE) should be emphasized in the design of SDS elements to facilitate fault diagnosis and proper corrective maintenance actions. These features are of particular importance in the design of space-based assets in view of the premium resources required for the maintenance support of those assets. Where external test equipment must be used, standard interfaces should be designed into the element to facilitate the use of such test equipment.

System-element reconfigurability provides the capability of bypassing nonfunctional portions of the system to achieve maximum functionality. The capability to bypass inoperable equipment or software will allow an extended mean time between maintenance activity (MTBMA), greater reliability, and reduced LCC. Reconfigurability design should allow for flexibility and the necessary processing to bypass failed functions without losing all capability.

Standardized analytic models and simulations, when used and made available throughout the SDS community, can decrease duplication of effort and reduce the cost of analysis. Interaction of simulation models will reduce the number of models required. Model interaction allows cause/effect relationships to be traced through several models, using the output of one as the input of another. More thorough analysis may then be made and definitive design guidelines set. This reduces the likelihood of requirements for redesign.

Interface control is of vital importance to the design of an easily supportable system. Since SDS is a system of systems, a large number of system interfaces will be required. Within each system, many unit interfaces will be needed. An overwhelming variety of interfaces may need to be designed, requiring an inordinate amount of support. Design directed toward minimization and standardization of interfaces reduces the variety that must be supported. Standardized interfaces should decrease LCC due to a smaller variety of spares to maintain in the supply system, procurement of spares in quantity, and simplified upgrade and maintenance procedures.

SDS health and status monitoring and reporting provide operational status, allowing prioritization of changes and selection of reconfiguration options. Monitoring and reporting

component failure will reduce LCC by reducing trouble-shooting requirements. Monitoring and reporting design should cause minimal impact on the viewed equipment and be highly reliable in and of itself.

Reliability-centered maintenance (RCM) can be used to reduce LCC and increase operational availability. It provides a method whereby a planned maintenance system can be designed to reduce unnecessary maintenance actions and increase reliability. Design factors such as fault-tolerant systems or service intervals affect how RCM is applied.

Human factors considerations affect the physical design of equipment and components. Accessibility to components lowers mean time to repair (MTTR) and LCC by making maintenance easier. However, human interface designs may add size and weight, increasing initial deployment costs. Operator interfaces affect system performance by determining the ease and speed with which data and commands can be sent and received.

Maintainability is the ease with which a system can be maintained, considering the skills, tools, test equipment, and time required to perform each maintenance task. The maintainability of a system is usually measured in quantitative terms (i.e., mean time to repair) and this parameter must also be established early to influence the architecture and design of SDS. Design efforts must consider the maintainability of SDS elements by providing easy access to components requiring frequent servicing and maintenance actions and ensuring that all maintenance actions can be readily performed in the shortest possible time with the skills, tools, and test equipment available.

System-element MTBFs will be the driving factors for many high-level decisions. The cost of increasing MTBF must be weighed against total LCC. LCC and reliability of space-based systems will be very sensitive to changes in MTBF. Quantitative and qualitative analysis will be used to define key factors dictating the most cost-effective options for meeting operational availability goals.

System-element service life determines planned maintenance requirements and design decisions for space-based and cryogenic systems. Cost is the predominant factor limiting component service life and must be balanced against the cost to repair or replace failed components. Ground-based systems may prove more cost effective, even though cheaper, shorter service life components must be replaced more frequently. The high cost of transportation for space-based systems makes components with higher costs and longer service lives more cost effective.

Launch vehicle supportability involves supplying and maintaining launch equipment, maintenance facilities, fuel storage facilities, transportation for fuel and equipment, weapon storage facilities, and assembly facilities. Launch vehicle concepts vary and require tradeoff analyses to be performed to determine which concept is most cost effective and appropriate.

CC/SOIF operating modes drive the complexity of the system design. Coordination among numerous elements in a real time environment necessitates complexity. Additional operating modes increase complexity and decrease reliability. Operational availability and capability are thus inversely related and require tradeoff analysis to determine which operating modes will be most cost effective without compromising mission effectiveness.

Survivability of a system or element is inherent in its design. Circuit hardening, redundancy, and physical construction all contribute toward survivability and are limited primarily by cost and weight restrictions.

Supportability design constraints may concern maintenance, PHS&T, facilities, support equipment, or environmental restrictions on the element level; while subsystem level constraints will be much more definitive. Constraints ensure that supportability issues are addressed during the design process, and thus costs can be kept to a minimum. All constraints must allow for human interface on a maintenance and/or operator level.

Reliability is a critical factor in the architecture and design of SDS and its elements. quantitative parameters (i.e., mean time between failure) must be established early in the acquisition cycle to ensure that architecture development and design efforts are properly oriented to achieve those objectives. Reliability governs the frequency of maintenance requirements or the frequency at which an element or component must be replaced if it cannot be maintained, particularly in the space environment. In addition to having a tremendous impact on operational and readiness considerations, it also directly affects the logistics burden and LCC of the system.

System-element environmental qualifications differ for space- and ground-based elements and require different design approaches. Restrictions imposed by environmental conditions may determine the cost effectiveness of standardized components, interchangeable among space- and ground-based elements.

Transportability also presents unique challenges to the architecture and design of SDS elements. These elements must be capable of being transported from manufacturing plants to their operational sites, or for space-based elements, to their launch sites and into space. Size and weight constraints normally associated with such movements must be considered in system architecture and design. In the case of mobile elements or components, transportability considerations must become a permanent factor in their configuration and design details.

5.10.2 Goals

The ultimate design goal is to increase performance and decrease costs. Total cost includes preproduction, production, deployment, and LCC. Primary design goals are aimed at obtaining the most beneficial system while reducing manpower levels, transportation requirements, component costs and increasing component reliability, system durability, and overall maintainability. An additional goal is to provide a highly reliable health and status monitoring capability. The result should be a system that is operable and maintainable by the user in its intended environment at the lowest achievable cost.

The primary logistics design goal is to produce a system that can be supported at the lowest achievable cost. LCC can be drastically reduced by designing for ease of maintenance, durability, accessibility, and transportability. By anticipating logistics requirements and designing to reduce the logistics costs before and after deployment, an economical and effective system will result.

The system readiness objective (operational availability) must be established early in the acquisition cycle as another design parameter for SDS. This parameter also influences the reliability and maintainability parameters (i.e., the frequency of failure and the time to repair each failure both affect availability of the system to perform its intended function). A high system readiness objective can be achieved by improving the reliability of the system, decreasing repair times, and/or providing redundant systems, all of which are governed by the architecture and design of SDS and its elements.

Metrication of SDI offers the advantage of conformity with most measurement systems but will involve increased near-term costs. Industry must change its production machinery to be

compatible with metric measures, and personnel must spend time learning to design and work in metric units. Long term cost payback may or may not occur.

Built-in logistics functions are required due to the complexity of SDI equipment. The extent to which built-in logistics functions such as BIT/BITE are used will depend upon costs, detail of testing, and capability for human intervention. Providing BIT/BITE with the ability to localize faults to the component level will reduce maintenance time and costs.

5.10.3 Strategy

SDIO design policy will affect R&M, survivability, transportability, and cost. An SDIO Management Directive will be published outlining design policy. Design constraints will apply to all aspects of the SDS system. The predominant constraint will be monetary. Available funding will drive key decisions concerning maintenance philosophy, launch system concepts, spare parts procurement and distribution, planned system updates, and manpower requirements. Monetary constraints will continue to apply down to the component level as other constraints are considered. Limiting factors may include technological capabilities, raw material availability, personnel skill levels, production requirements, transportation capabilities, and political pressure. Service/system-element program managers will brief all contractor design personnel on the peculiarities of the operational environment as required.

System-element PMOs should evaluate the impact of the following design influence areas on their program:

- Fastener standardization
- Communications and crypto standardization
- Guidance and control standardization
- Cryogenic component standardization
- Maneuvering system standardization
- System-element reconfigurability
- Fuel system standardization
- Metrication
- System-element MTBF
- Standardized analytic models and simulations
- Simulation model interaction
- Interface control
- SDS health and status monitoring and reporting
- Applicability of reliability-centered maintenance
- Built-in logistics functions
- Electronics - very high speed integrated circuit (VHSIC), very large scale integration (VLSI), modular avionics system architecture (MASA)
- System-element service life
- Human interface
- System-element environmental qualifications
- Supportability design constraints
- Launch vehicle supportability
- Survivability
- CC/SOIF operating modes
- Sustainability
- Material/finish standardization
- TMDE standardization
- Lift/grip service standardization

State of the art electronics such as VHSIC and VLSI will affect maintenance issues, graceful degradation capabilities, the use of built-in logistics, and LCC. QA and testing procedures must be strenuous for state-of-the-art electronics to compensate for the lack of data obtained from extensive field use.

5.11 Configuration Management (CM)

5.11.1 Concepts

Configuration Management (CM) provides for the identification, control, status accounting, and audit of SDS technical data to ensure the traceability of decisions and requirements during the evolution of the SDS via the development of a Configuration Management Plan (CMP). The CMP for the SDS has been prepared by a Government/industry Configuration Management Work Group (CMWG) and is published as a separate document.

The SDS CMP will also provide a methodology to index and provide the current status of designated SDIO non-technical and SDI-related technical documentation such as test requirements. These two support efforts have been integrated into a single CM. The baselined and controlled technical documentation will be processed according to classic configuration management procedures. It will be issued by a release desk. Related non-baseline documentation will be submitted directly to the release desk for issue.

5.11.2 Goals

The CM goals are to:

- Establish CM baselines upon which logistics support requirements may be developed.
- Control CM changes to ensure logistics impacts are considered.
- Use CM procedures oriented toward establishing and controlling SDS documentation used to define three progressive baselines.
- Trace program technical and programmatic decision.

6.0 SUPPORT TRANSITION PLANNING

Support transition planning will be developed and documented as the support concept for SDS becomes more definitized.

7.0 SUPPORT RESOURCE FUNDS

As the support concept for SDS becomes more definitive, support resource fund requirements will evolve.

8.0 POST-FIELDING ASSESSMENTS

Post-fielding assessments will be developed with the support concept.

SECTION III

ILS MILESTONE SCHEDULES

1.0 MASTER MILESTONE CHART

Figure 1.0-1 represents SDS system-level milestones. These milestones are derived from the SDS networking activity and will be used to develop the SDS Master Milestone Chart.

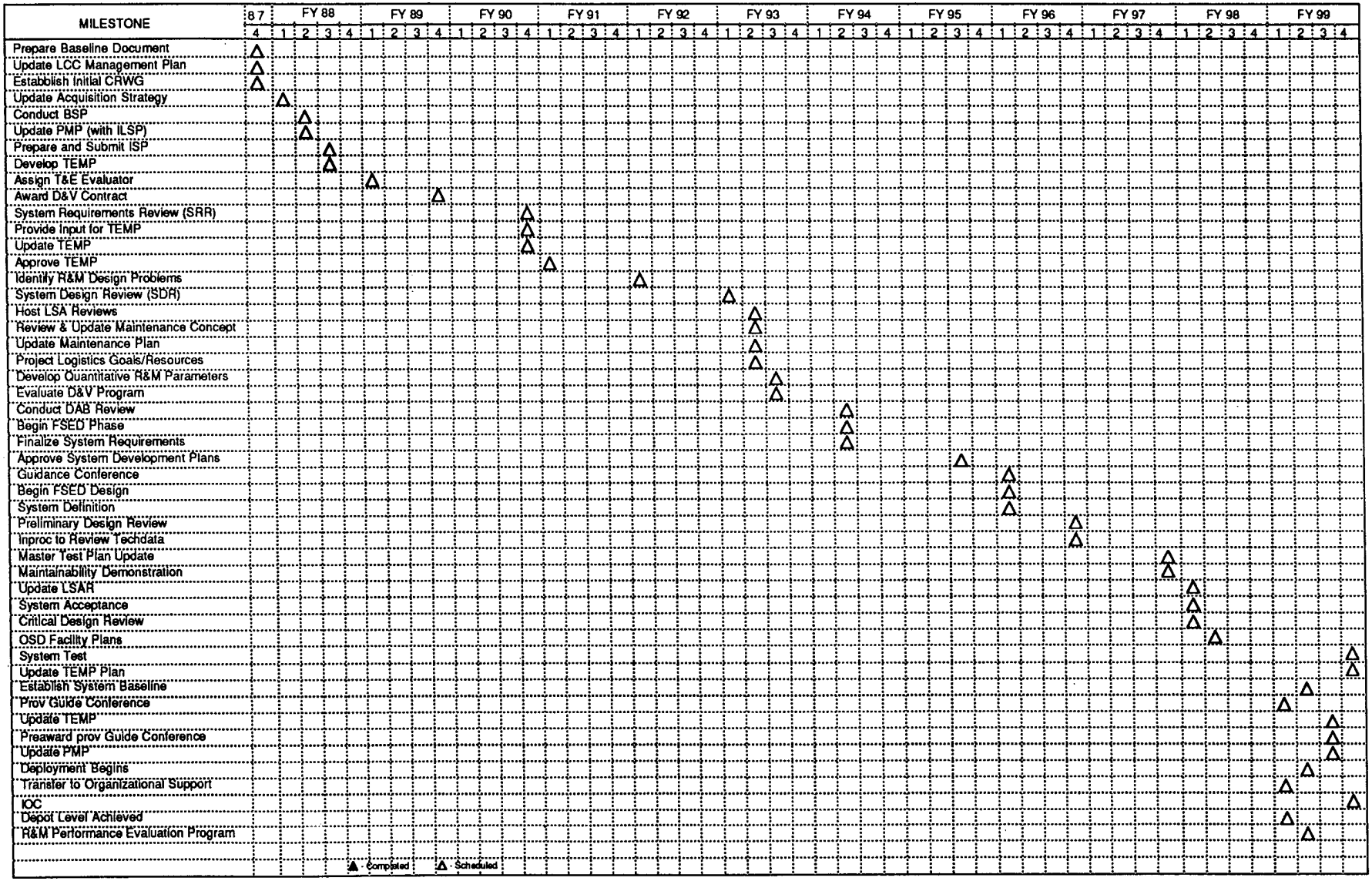


FIGURE 1.0-1 SYSTEM-LEVEL MILESTONE

2.0 ILS PROGRAM MILESTONE CHART

Figure 2.0-1 depicts SDIO ILS milestones. Each milestone represents an approximate timeframe for completing major tasks and events. Individual milestones may be adjusted as recommended by the ISWG ILS Panel, the ILSMT, or SDIO/S/PL.

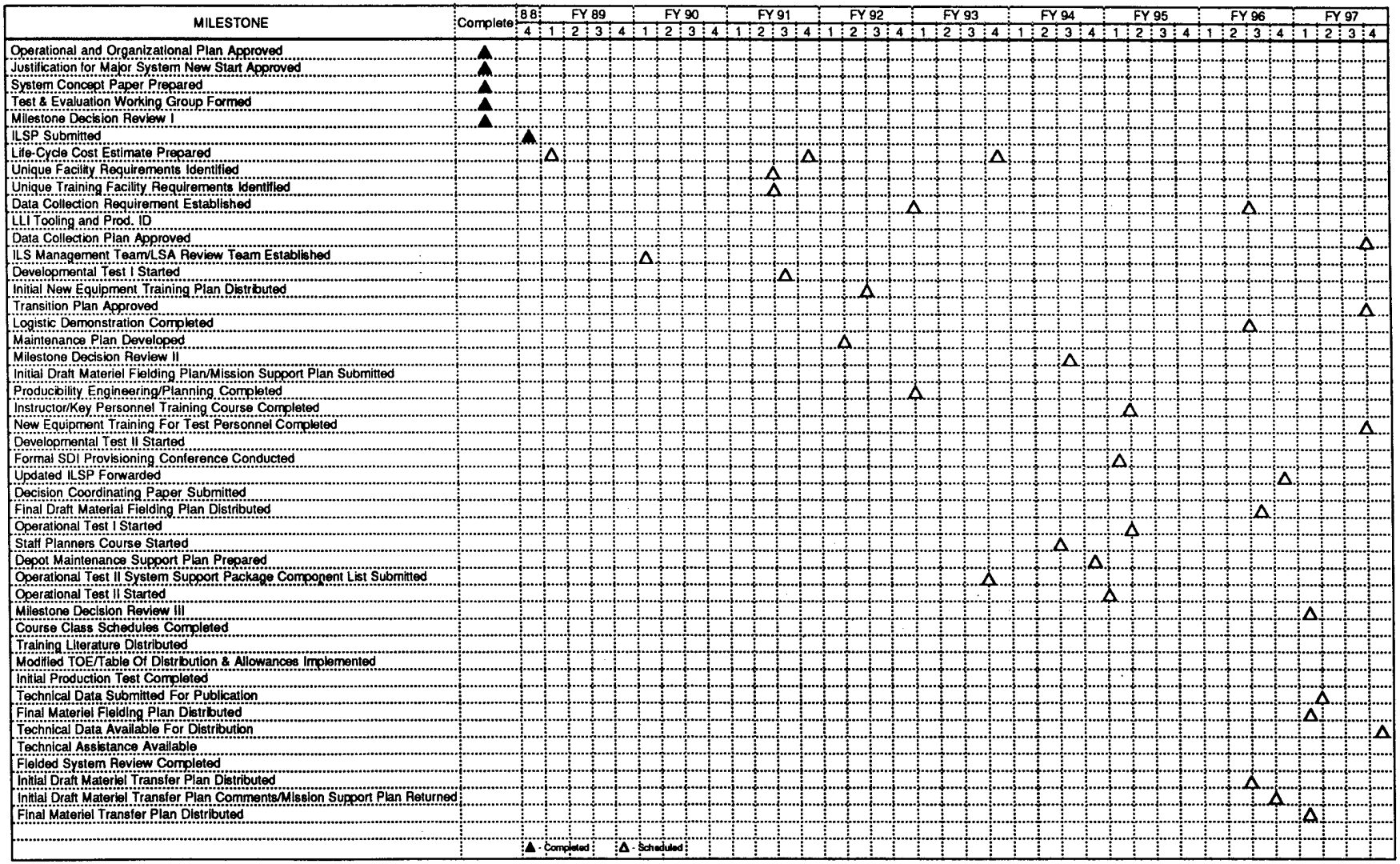


FIGURE 2.0-1 SDIO ILS MILESTONES

3.0 SERVICE-LEVEL MILESTONE CHART

Figure 3.0-1 (TBD) presents Tier 1 of the Service-level ILS milestones during the 4-year DEM/VAL phase. Tier 2 milestone charts are to be found in the Service ILSPs. Updates will be provided annually. Revisions will be accomplished following the entry of Phase I into FSD. Follow-on SDS will be included when they enter into the DEM/VAL phase. The following system-elements are represented:

- CC/SOIF
- GSTS
- SSTS
- BSTS
- ERIS
- SBI
- SDS Space Transportation System
- NTB

* Although not part of the SDS architecture, the NTB is included to reflect/coordinate test and simulation activity.

ANNEX A

SERVICE INTEGRATED LOGISTICS SUPPORT PLAN

ANNEX A

SERVICE INTEGRATED LOGISTICS SUPPORT REFERENCES

ATTACHMENT 1

U.S. Army Strategic Defense Command, Integrated Logistics Support Implementation Guide for the Strategic Defense System, October 1987.

ATTACHMENT 2

Strategic Defense Initiative Program Support Plan for Air Force Systems, April 1987.

ANNEX B

SYSTEM-ELEMENT INTEGRATED LOGISTICS SUPPORT

ANNEX B

SYSTEM-ELEMENT INTEGRATED LOGISTICS SUPPORT

ARMY

ATTACHMENT 1

Command Center/System Operation Integration Function (CC/SOIF) Integrated Logistics Support Plan

ATTACHMENT 2

Ground-Based Surveillance and Tracking System (GSTS) Integrated Logistics Support Plan

ATTACHMENT 3

Exoatmospheric Reentry-Vehicle Interceptor System (ERIS) Integrated Logistics Support Plan

AIR FORCE

ATTACHMENT 4

Boost Surveillance and Tracking System (BSTS) Integrated Logistics Support Plan

ATTACHMENT 5

Space-Based Surveillance and Tracking System (SSTS) Integrated Logistics Support Plan

ATTACHMENT 6

Space-Based Interceptor (SBI) Integrated Logistics Support Plan CC/SOIF Place Holder and their application - See Army to be provided.

OTHER

ATTACHMENT 7

SDS Transportation System Integrated Logistics Support Plan CC/SOIF Place Holder and their application - See Army to be provided.

ANNEX C

INTEGRATED LOGISTICS SUPPORT MANAGEMENT TEAM CHARTER

ANNEX C

INTEGRATED LOGISTICS SUPPORT MANAGEMENT TEAM (ILSMT) CHARTER

The Integrated Support Working Group (ISWG) ILS Panel will perform most functions of the ILSMT until the ILSMT is formed and an approprate charter prepared. In the iterim, this annex is a placeholder for the ILSMT charter.

ANNEX D

SDIO SUPPORTABILITY DOCUMENT TREE

ANNEX D

SDIO SUPPORTABILITY DOCUMENT TREE

The SDIO Supportability Document Tree is designed to identify and track documents pertaining to specified subject areas (or processes). As a hierarchy of linked spreadsheets, it provides greater levels of detail as embedded sheets are accessed. The opening screen, as shown in Figure E-1, identifies the organizations which are players in SDS and the key subject areas. The system is designed to accept additional organizations or subjects as required.

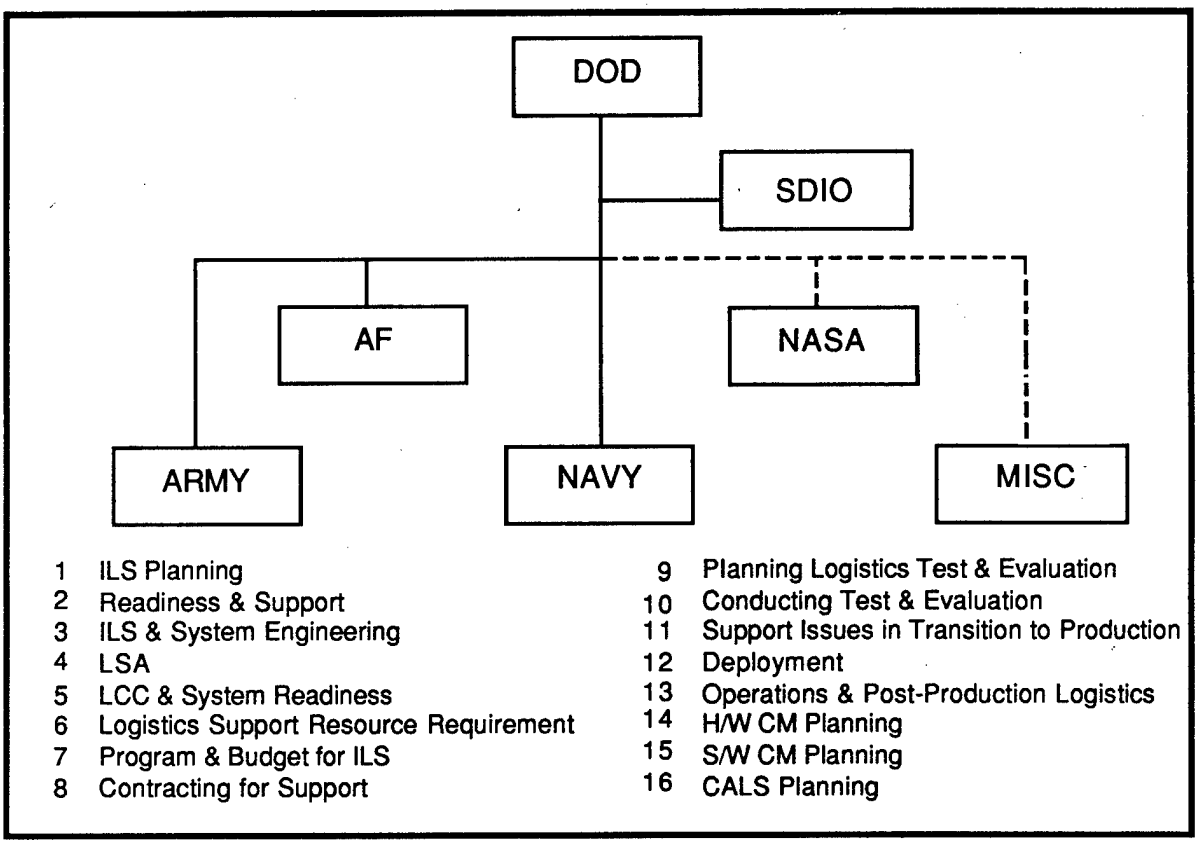


FIGURE D-1 SDIO SUPPORTABILITY DOCUMENT TREE ORGANIZATION & FUNCTIONAL AREA MENU

From this opening screen, the user can select an organization or a subject area. If an organization is selected, a listing of that organization's lead documents is displayed (Figure D-2). If the subject area is selected, the input and output documents for that subject (process) are displayed (Figure D-3). To provide a means of determining the status (whether it exists, is in draft, needs to be written, etc.) of an output document, it can be selected and its status is displayed.

DoD

1.	ILS Planning	DoDD 5000.39
2.	Readiness and Supportability	DoDD 5000.1
3.	ILS and Systems Engineering	MIL-STD-499A
4.	Logistics Support Analysis	MIL-STD-1388-1A/2A
5.	LCC and System Readiness	DoDD 5000.4
6.	Logistics Support Resource Rqmt	MIL-STD-1388-1A/2A
7.	Program and Budget for ILS	DoDD 7045.14
8.	Contracting for Support	DoDD 4105.62
9.	Planning Logistics Test and Evaluation	DoDD 5000.3
10.	Conducting Logistics Test & Evaluation	DoDD 5000.3
11.	Support Issues in Transition to Production	DoDD 4245.7
12.	Deployment	MIL-STD-1388-1A
13.	Operations and Post-Production Logistics	DoDD 4151.1
14.	Hardware CM Planning	DoDD 5010.19
15.	Software CM Planning	DoDD 5010.19
16.	CALS Planning	MIL-STD-1840

FIGURE D-2 SDIO SUPPORTABILITY DOCUMENT TREE LEAD ORGANIZATIONAL DOCUMENTS (DoD)

1

INPUT DOCUMENTS	OUTPUT DOCUMENTS, INFO
DoDD 5000.39 (Acq Mgmt of ILS)	DSMC ILS Guide
AR 700-127 (ILS)	Program Planning Documents
AFR 800-8 (ILS)	ILS Capstone
SECNAVINST 5000.39 (ILS)	SDS ILS Plan
DI-ILSS-80395	Integrated Support Plan
DI-ILSS-80095	Deployment Plan
DI-P-7119 (Post-Production Support)	LSA Plan
DI-S-7120 (Support Assess Plan)	SIST-Related Documents
DI-L-7017A (LSA Plan)	ILS Elements Plans
DA PAM 700-50	Feedback to Program Plan
SDIO Supportability Policy	ILS Management Directive
SDS SCP	ILS Networking Mgmt Directive
SDS TEMP	SDIO Modeling Directive

FIGURE D-3 SDIO SUPPORTABILITY DOCUMENT TREE FUNCTIONAL AREA DOCUMENTS (ILS PLANNING)

For the ILS planning area, an additional level of indenture has been added to address the ILS elements. If ILS planning is selected as discussed above, the user is then given the choice of selecting ILS planning again or one of the ILS elements. Selecting ILS planning again will result in displaying the screen shown in Figure D-3. If one of the elements is selected (screen under development), a comprehensive listing of applicable documents pertaining to the element is displayed. Provided below are the listings of documents pertinent to each ILS element.

SUPPLY SUPPORT AND PROVISIONING

DOD DIRECTIVES (DODD)

2000.8	Cooperative Logistic Supply Support Arrangements
4011.35	Integrated Logistical Supply for Systems and Equipment
4140.26	Integrated Materiel Management of Consumable Items
4140.40	Basic Objectives and Policies on Provisioning of End Items of Materiel
4140.42	Determination of Initial Requirements for Secondary Item Spare and Repair Parts
4140.43	DoD Liquid Hydrocarbon Fuel Policy for Equipment Design, Operation, & Support
4151.7	Uniform Technical Documentation for Use in Provisioning of End Items
4245.12	Spares Acquisition Integrated With Production (SAIP)
4275.5	Acquisition and Management of Industrial Resources
4410.6	Uniform Materiel Movement and Issue Priority System
5000.37	Acquisition and Distribution of Commercial Products (ADCP)
7000.1	Resource Management Systems of DoD

MILITARY STANDARDS (MIL-STD)

789C	Contractor Technical Information Coding of Replenishment Parts
965A	Parts Control Program
1517	Phased Provisioning
1545	Optional Spare Parts Maintenance & Inventory Support of Space & Missile Systems
1552	Uniform DoD Provisioning Technical Documentation
1561B	Uniform DoD Provisioning Procedures

AIR FORCE REGULATIONS (AFR)

57-6	High Dollar Spare Parts Breakout Program
800-24	Parts Control Program (PCP)
800-26	Spares Acquisition Integrated With Production
800-36	Provisioning of Spares and Repair Parts
800-45	Modular Avionics System Architecture (MASA) ILS Requirements

JOINT AIR FORCE LOGISTICS/SYSTEMS COMMAND PUBLICATIONS (AFLCR/AFSCR)

800-20	Defective Parts and Components Control Program (DPCCP)

ARMY REGULATIONS (AR)

70-2	Materiel Status Recording
700-18	Provisioning of US Army Equipment
700-22	Worldwide Ammunition Reporting System (WARS)
700-120	Materiel Distribution Management
710-1	Centralized Inventory Management of the Army Supply System
715-22	High Dollar Spare Parts Breakout Program
725-50	Requisitioning, Receipt, and Issue System

DARCOM REGULATIONS (DARCOM-R or AMCR)

700-46	Provisioning Management

DARCOM/AMC PAMPHLETS (DARCOM-P or AMC-P)

700-10	Provisioning Techniques

PACKAGING, HANDLING, STORAGE, AND TRANSPORTATION (PHS&T)

DOD DATA ITEM DESCRIPTIONS (DID)

DI-L-6148	Transportability Evaluation Plan/Report
DI-L-6149	Transportation Plan
DI-L-30340A	Packaging Management Plan

DOD DIRECTIVES (DoDD)

3224.1	Engineering for Transportability
4140.50	Management of DoD Locomotives
4145.19	Storage and Warehousing Facilities
4410.6	Uniform Materiel Movement and Issue Priority System
4500.9	Transportation and Traffic Management
4510.10	Railroads for National Defense

MILITARY STANDARDS (MIL-STD)

129	Marking for Shipment and Storage
130	Identification of U.S. Military Equipment
648A	Design Criteria for Specialized Shipping Containers
794E	Procedures for Packaging of Parts and Equipment
2073-1A	DoD Materiel Procedures for Development and Application of Packaging Requirements

MILITARY EQUIPMENT (ME)

E-7555H	Packaging of Electronic and Electrical Equipment Accessories and Provisioned Items

AIR FORCE REGULATIONS (AFR)

75-14	Joint Army-AF CONEX Container Pool Agreement
75-24	Permits for Special Military Movement on Public Highways
75-88	Highway for National Defense
80-18	DoD Engineering for Transportability

ARMY REGULATIONS (AR)

55-1	CONEX Container Control, Utilization, and Reporting
55-13	Appointment of Transportation Officers and Acting Transport Officers
55-14	Army Management Fund Transportation Transactions
55-16	Movement of Cargo by Air and Surface
55-17	Lease of CONEX Transporters
55-27	Vehicle and Component Parts Movement Schedule for Shipment Forecast
55-29	Military Convoy Operations in CONUS
55-30	Space Requirements and Performance Reports for Transport Movements
55-55	Transportation of Radioactive and Fissile Materials Other Than Weapons
55-80	Highways for National Defense
55-113	Movements of Units Within Continental United States
55-162	Permits for Special Military Movement on Public Highways
55-165	Army-Air Force Agreement for Joint Operation of CONEX Container Pool
55-203	Movement of Nuclear Weapons, Nuclear Components, and Related Material
55-228	Transportation By Water of Explosives and Hazardous Cargo
55-255	Railroad Equipment (DARCOM Supplement 1)
55-257	Operation of Utility Railroad Equipment (DARCOM Supplement 1)
55-292	Planning for, and Operation of, Staging Facilities in CONUS
55-365	Terminal Facilities Guide: Commercial Contractors
55-650	Military Railroads
70-44	DoD Engineering for Transportability
70-47	Engineering for Transportability
700-120	Materiel Distribution Management

TECHNICAL DATA AND DATA MANAGEMENT

DOD DATA ITEM DESCRIPTIONS (DID)

DI-E-1115B	TECHNICAL DATA PACKAGE

DOD DIRECTIVES (DODD)

4105.55	Selection and Acquisition of Automatic Data Processing Resources
4151.7	Uniform Technical Documentation for Use in Provisioning of End Items

4151.9	DoD Technical Manual Program Management
4200.15	Manufacturing Technology Program
5000.11	Data Elements and Data Codes Standardization Program
5000.12	Data Elements and Data Codes Standardization Procedures
5000.19	Policies for the Management and Control of Information Requirements
5000.27	Logistics Data Element Standardization and Management Program
5010.12	Management of Technical Data
5100.40	Responsibility for the Administration of the DoD ADP Program
5200.21	Dissemination of DoD Technical Information
5200.28	Security Requirements for Automatic Data Processing (ADP) Systems
7000.11	Contractor Cost Data Reporting

DOD STANDARDS (DOD-STD)

100D	Engineering Drawing Practices
863B	Preparation of Wiring Data and Schematic Diagrams

MILITARY STANDARDS (MIL-STD)

12	Abbreviations for Use on Drawings, Specifications, Standards, and Technical Documents
480	Configuration Control-Engineering Changes, Deviations, and Waivers
481	Configuration Control-Engineering Changes, Deviations & Waivers
482A	Configuration Status Accounting Data Element and Related Features
490A	Specification Practices
970	Order Preference for the Selection of Standards and Specifications
1304	Reliability and Maintainability Engineering Data Reports
1552	Uniform DoD Provisioning Technical Documentation
1556	Government-Industry Data Exchange Change Program (GIDEP)

AIR FORCE REGULATIONS (AFR)

80-10	Government-Industry Data Exchange Program (GIDEP)
310-1	Technical Data Control

ARMY REGULATIONS (AR)

5-7	Defense Logistics Studies Information Exchange
18-1	Management Information Systems
70-21	Certification for Access to Scientific and Technical Information
70-23	The Technical Cooperation Program
70-33	Mutual Weapons DEVEL Data Exchange PGM (MWDDEP) and Defense DEVEL Exchange PGM (DDEP)
70-41	Cooperation with Allies and Other Nations in Research and Development of Defense Equipment
348-18	The Army Functional Files System
700-51	Army Data Management Program
750-37	Sample Data Collection - The Army Maintenance Management System (TAMMS)

DARCOM REGULATIONS (DARCOM-R OR AMC-R)

18-5	DARCOM Information and Data Systems
70-46	Technical Data Package for Procurement and Production of AMC Materiel
70-56	Government-Industry Data Exchange Program (GIDEP)

TRAINING AND TRAINING SUPPORT (TRAINING DOCUMENTATION)

DOD DATA ITEM DESCRIPTIONS (DID)

DI-H-7066	Training and Training Equipment Plan

AIR FORCE REGULATIONS (AFR)

50-8	Policy and Guidance for Instruction System Development (ISD)
50-9	Special Training
50-11	Management of Training Systems
50-48	System Managed Training and Support Equipment

ARMY REGULATIONS (AR)

10-41	Organization and Functions, US Army Training & Doctrine Command (TRADOC)
70-8	Personnel Performance and Training Program (PPTP)
71-7	Military Training Aids and Army Training Aids Centers
350-XX	New Equipment Training and Introduction (Supercedes AR 71-5)
350-35	Army Modernization Training
350-38	Training Device Policies and Procedures

TRADOC PAMPHLETS (TRADOC-P)

71-10	Cost and Training Effectiveness Analysis Handbook

TRADOC CIRCULARS (TRADOC-C)

70-1	Training Device Development
350-30	Inter-Service Procedures for Instructional System Development

CHIEF OF NAVAL OPERATIONS INSTRUCTIONS (OPNAVINST)

5311.7	Determining Manpower, Personnel, and Training (MPT) Requirements for Navy Acquisitions

DOD DATA ITEM DESCRIPTIONS (DID)

DI-S-6174B	Facilities Design Criteria
DI-S-6175B	Facility Design Concepts

DOD DIRECTIVES (DOD)

4145.19	Storage and Warehousing Facilities
4165.3	DoD Facility Classes and Construction Categories
4165.6	Real Property Acquisition, Management, and Disposal
4270.1	Construction Criteria
4270.5	Military Construction Responsibilities
4270.32	Secretary of Defense Military Construction Contingency Authorities
5100.43	Defense Special Missile and Astronautics Center (DEFSMAC) (S)
7040.4	Military Construction Authorization and Appropriation
7150.5	Responsibility for Programming and Financing Facilities at DoD Install Utilized by Two or More DoD Components

AIR FORCE REGULATIONS (AFR)

88-3	Air Force Contract Construction
88-12	Troop Construction for the Air Force

AIR FORCE MANUALS (AFM)

86-1	Military Construction Program
88-2	Standard Facility Requirements

ARMY REGULATIONS (AR)

37-40	Army Production Base Support Program Report
55-292	Planning for, and Operation of, Staging Facilities in CONUS
55-365	Terminal Facilities Guide: Commercial Contractors
210-20	Master Planning for Army Installations
405-10	Acquisition of Real Property and Interests Therein
415-1	Report of Negotiated Construction Contracts and Modifications
415-2	DoD Construction Criteria
415-10	General Provisions for Military Construction
415-11	Air Force Contract Construction
415-13	MCA Program - Disposal of Structure
415-15	MCA Program Development
415-16	Army Facilities Components System
415-17	Empirical Cost-Estimates for Military Construction and Adjustment Factors
415-20	Project Development and Design Approval
415-22	Protection of Petroleum Installations and Related Facilities
415-25	Real Property Facilities for RDT&E
415-28	Department of the Army Facility Classes and Construction Categories

415-30	Troop Construction for the Air Force
415-32	Performance of MILCON Projects in CONUS by Troop Units
415-35	Minor Construction
415-50	CONUS Basic Facilities and Space Allowance for Emergency Construction

DARCOM REGULATIONS (DARCOM-R OR AMC-R)

70-9	Test Facility Management
210-2	Directory of AMC Installations

MANPOWER AND PERSONNEL (M&P)

DOD DIRECTIVES (DODD)

5000.16	Joint Logistics and Personnel Policy and Guidance

DOD HANDBOOKS (DOD-HDBK)

743	Anthropometry of US Military Personnel
761	Human Engineering Guidelines for Management Information Systems

MILITARY HANDBOOKS (MIL-HDBK)

759a	Human Factors Engineering Design for Army Materiel
46855b	Human Engineering Requirements for Military Systems, Equipment, and Facilities (METRIC)

MILITARY STANDARDS (MIL-STD)

1472c	Human Engineering Design Criteria for MIL Systems, Equipments and Facilities
1567	Work Measurement

AIR FORCE REGULATIONS (AFR)

26-3	Air Force Manpower Standards
39-1	Airman Classification
800-15	Human Factors Engineering

ARMY REGULATIONS (AR)

70-8	Personnel Performance and Training Program (PPTP)
570-1	Commissioned Officer Aviation Position Criteria
570-2	Organization and Equipment Authorization Tables - Personnel
570-5	Manpower Staffing Standards System

600-200 Enlisted Personnel Management
602-1 Human Factors Engineering Program
602-2 Manpower and Personnel Integration (MANPRINT) in Materiel Acquisition
611-1 MOS Development and Implementation
611-101 Commissioned Officer Specialty Classification
611-112 Manual of Warrant Officer Military Occupational Specialties
611-201 Enlisted Career Management Fields and Military Occupational Specialties

TRADOC REGULATIONS (TRADOC-R)

11-1 Manpower Analysis and Force Structuring in Combat Development Forces
351-5 Designation of MOS/ASI Proponency
600-4 Integrated Personnel Support

CHIEF OF NAVAL OPERATIONS INSTRUCTIONS (OPNAVINST)

5310.19 Preliminary Shipboard Manpower Document
5311.7 Determining Manpower Personnel, and Training (MPT) Requirements for Navy Acquisitions

COMPUTER RESOURCE SUPPORT

DOD DATA ITEM DESCRIPTIONS (DID)

DI-S-30569 Computer Resources Integrated Support Data

DOD DIRECTIVES (DODD)

5000.29 Management of Computer Resources in Major Defense Systems
5215.1 Computer Security Evaluation Center

DOD STANDARDS (DOD-STD)

2167 Defense System Software Development

MILITARY STANDARDS (MIL-STD)

1521 Technical Reviews and Audits for Systems, Equipment, and Computer Programs

AIR FORCE REGULATIONS (AFR)

800-14 Life-Cycle Management Computer Resources in Systems

MAINTENANCE PLANNING

DOD DATA ITEM DESCRIPTIONS (DID)

DI-S-1822	Maintenance Documentation and Analysis Plan

DOD DIRECTIVES (DODD)

4151.1	Use of Contractor and DoD Resources for Maintenance of Materiel
4151.11	Policy Governing Contracting for Equipment Maintenance Support
4151.12	Policies Governing Maintenance Engineering within DoD
4151.15	Depot Maintenance Programming Policies
4151.16	DoD Equipment Maintenance Program

MILITARY SPECIFICATIONS

MILITARY HANDBOOKS (MIL-HDBK)

189	Reliability Growth Management
217E	Reliability Prediction of Electronic Equipment
472	Maintainability Prediction

MILITARY MANUALS (MIL-M)

M-24100	Functionally Oriented Maintenance Manuals for Systems and Equipment
M-38793	Calibration and Alignment

MILITARY PAMPHLETS (MIL-P)

P-116H	Methods of Preservation
P-9024B	Packaging, Handling, and Transportability in System/Equipment Acquisition

MILITARY STANDARDS (MIL-STD)

470A	Maintainability Program Requirements for Systems and Equipment
471B	Maintainability Verification/Demonstration/Evaluation
721B	Definitions of Effectiveness Terms for Reliability, Maintenance, Human Factors, and Safety
756B	Reliability Modeling and Prediction
1304	Reliability and Maintainability Engineering Data Reports
1567	Work Measurement
1843	Reliability-Centered Maintenance for Aircraft, Engines, and Equipment
45662	Calibration and Alignment

AIR FORCE REGULATIONS (AFR)

66-14	Equipment Maintenance Policies, Objectives, and Responsibilities

66-44 Equipment Maintenance Quality Reliability Assurance Program
80-5 Reliability and Maintainability Criteria

AIR FORCE MANUAL (ARM)

66-279 Core-Automated Maintenance System (CAMS)

ARMY REGULATIONS (AR)

750-1 Army Materiel Maintenance Concepts and Policies
750-7 Installation Materiel Maintenance Activities
750-10 Modification of Materiel and Issuing Safety-of-Use Messages
750-15 Rebuild and Maintenance of Aircraft
750-37 Sample Data Collection - The Army Maintenance Management System (TAMMS)
750-43 Test, Measurement, and Diagnostic Equipment (TMDE)

DARCOM REGULATIONS (DARCOM-R OR AMC-R)

750-27 AMC Utilization of Maintenance Data

DEPARTMENT OF THE ARMY TECHNICAL MANUAL (TM)

38-750 The Army Maintenance Management System (TAMMS)

DEPARTMENT OF THE ARMY PAMPHLETS (DA-PAM)

750-40 Guide to Reliability Centered Maintenance (RCM) for Fielded Equipment

NSA SPECIFICATIONS (NSA SPEC)

74-7 Calibration and Alignment

SUPPORT EQUIPMENT

DOD DATA ITEM DESCRIPTIONS (DID)

DI-A-6102a Support Equipment Plan
DI-A-1820 Support Equipment Plan

MILITARY STANDARDS (MIL-STD)

1546 Contractor-Furnished Equipment vs. Government-Furnished Equipment Selection Process

45662 Calibration and Alignment

AIR FORCE REGULATIONS (AFR)

800-22 Contractor-Furnished Equipment vs. Government-Furnished Equipment Selection Process

ARMY REGULATIONS (AR)

750-43 Test, Measurement, and Diagnostic Equipment (TMDE)

NSA SPECIFICATIONS

74-7 Calibration and Alignment

DESIGN INTERFACE

DOD DIRECTIVES (DODD)

2010.6 Standardization and Interoperability of Weapons Systems within NATO
3222.3 DoD Electromagnetic Compatibility Program
4140.43 DoD Liquid Hydrocarbon Fuel Policy for Equipment Design, Operation, and Support
4245.3 Design to Cost
5000.28 Design to Cost

DOD STANDARDS (DOD-STD)

1476a Metric System Application in New Design

MILITARY HANDBOOKS (MIL-HDBK)

727 Design Guidance for Producibility

MILITARY STANDARDS (MIL-STD)

415 Design Criteria for Test Provisions for Electronic Systems and Equipment
483 Interface Design Compatibility

ARMY REGULATION (AR)

70-64 Design to Cost

DARCOM CIRCULARS (DARCOM-C)

715-4-76	Item III Design-to-Cost
715-11-76	Item III Design-to-Cost

SDIO WORK PACKAGE DIRECTIVES (WPD)

B251	Systems Integration

CONFIGURATION MANAGEMENT

DOD DIRECTIVES (DODD)

5000.45	Baselining of Selected Major Systems
5010.19	Configuration Management
5010.21	Configuration Management Implementation Guidance

DOD STANDARDS (DOD-STD)

480	Configuration Control, Engineering Changes, Deviations, and Waivers

MILITARY STANDARDS (MIL-STD)

480	Configuration Control - Engineering Changes, Deviations, and Waivers
481	Configuration Control - Engineering Changes, Deviations, and Waivers
482a	Configuration Status Accounting Data Element and Related Features

AIR FORCE REGULATIONS (AFR)

57-4	Retrofit Configuration Changes
65-3	Configuration Management

ARMY REGULATIONS (AR)

70-37	Configuration Management
71-5	Introduction of New or Modified Systems/Equipment (Supply by AR 350-XX)
750-10	Modification of Materiel and Issuing Safety-of-Use Messages

DARCOM REGULATIONS (DARCOM-R OR AMC-R)

750-20	Modification of Materiel

NSA/CSS REGULATION (NSA/CSS)

80-14	Configuration Management

ANNEX E

ACQUISITION RELATED DOCUMENTS

FEDERAL GOVERNMENT

ACQUISITION RELATED DOCUMENTS

FEDERAL GOVERNMENT

FEDERAL STANDARD (FED-STD)

376A	Preferred Metric Units for General Use by the Federal Government

DEPARTMENT of DEFENSE

DATA ITEMS

DI-A-6102A	Support Equipment Plan
DI-E-1115B	Technical Data Package
DI-H-7066	Training and Training Equipment Plan
DI-ILSS-8024A	Computer Resources Integrated Support Data
DI-ILSS-80095	Integrated Logistics Support Plan
DI-ILSS-8095	Integrated Support Plan
DI-ILSS-80531	Logistics Support Analysis Plan
DI-L-6148	Transportability Evaluation Plan/Report
DI-L-6149	Transportation Plan
DI-L-30340A	Packaging Management Plan
DI-P-7119	Post Production Support Plan
DI-S-1820	Support Equipment Plan
DI-S-6174B	Facilities Design Criteria
DI-S-6175B	Facility Design Concepts
DI-S-7120	Supportability Assessment Plan
DI-MCCR-80024	Computer Resources Integrated Support Data

DoD DIRECTIVES (DoDD)

1000.3	Accident Prevention, Safety and Occupational Health Policy for DoD
2000.8	Cooperative Logistic Supply Support Arrangements
2000.9	International Coproduction Agreements
2010.6	Standardization and Interoperability of Weapons Systems within NATO
2010.7	Policy on Rationalization of NATO/NATO Member Telecommunication Facilities
3222.3	DoD Electromagnetic Compatibility Program
3224.1	Engineering for Transportability
3235.1-H	Test and Evaluation of System RAM, a Primer
3405.1	Computer Programming Language Policy
3405.2	Use of ADA in Weapon Systems

4000.19	Interservice, Interdepartmental, and Interagency Support
4005.16	Diminishing Manufacturing Sources and Material Shortages Program
4011.35	Integrated Logistical Supply for Systems and Equipment
4100.37	Retention and Transfer of Materiel Assets
4105.55	Selection & Acquisition of Automatic Data Processing Resources
4105.62	Proposal Evaluation and Source Selection
4120.3	Defense Standardization and Specification Program
4120.3-M	Defense Standardization and Specification Program Policies, Procedures and Instructions
4120.14	Environmental Pollution Prevention, Control, and Abatement
4120.18	DoD Metrication Program
4120.19	DoD Parts Control Program
4120.20	Development and use of Non-Government Specifications and Standards
4120.21	Specifications and Standards Application
4140.26	Integrated Materiel Management of Consumable Items
4140.40	Basic Objectives and Policies on Provisioning of End Items of Materiel
4140.42	Determination of Initial Requirements for Secondary Item Spare and Repair Parts
4140.43	DoD Liquid Hydrocarbon Fuel Policy for Equipment Design, OPN, & Support
4140.50	Management of DoD Locomotives
4145.19	Storage and Warehousing Facilities
4151.1	Use of Contractor and DoD Resources for Maintenance of Materiel
4151.7	Uniform Technical Documentation for use in Provisioning of End Items
4151.9	DoD Technical Manual Program Management
4151.11	Policy Governing Contracting for Equipment Maintenance Support
4151.12	Policies Governing Maintenance Engineering within DoD
4151.15	Depot Maintenance Programming Policies
4151.16	DoD Equipment Maintenance Program
4155.1	Quality Program
4155.19	NATO Quality Assurance
4156.1	DoD Coordinated Procedure Program Purchase Assignments
4165.3	DoD Facility Classes and Construction Categories
4165.6	Real Property Acquisition, Management and Disposal
4200.15	Manufacturing Technology Program
4245.3	Design to Cost
4245.4	Acquisition of Nuclear-Survivable Systems
4245.5	Indirect Cost Monitoring Office
4245.6	Defense Procuction Management
4245.7	Transition from Development to Production
4245.8	DoD Value Engineering Program
4245.9	Competitive Acquisitions
4245.12	Spares Acquisition Integrated with Production (SAIP)
4270.1	Construction Criteria
4270.5	Military Construction Responsibilities
4270.32	Secretary of Defense Military Construction Contingency Authorities
4275.5	Acquisition and Management of Industrial Resources
4410.3	Policies and Procedures for the DoD Master Urgency List
4410.4	Military Production Urgencies System
4410.6	Uniform Materiel Movement and Issue Priority System

4500.9	Transportation and Traffic Management
4510.10	Railroads for National Defense
4600.3	Electronic Counter Countermeasures (ECCM) Policy (C)
4600.4	Command, Control, and Communications (C^3) Countermeasures
4605.2	Restoration Priorities for Military Communications Channels (C)
4650.1	Management and use of the Radio Frequency Spectrum
5000.1	Major and Non-Major Defense Acquisition Programs
5000.2	Major System Acquisition Procedures
5000.3	Test and Evaluation
5000.4	OSD Cost Analysis Improvement Group (CAIG)
5000.11	Data Elements and Data Codes Standardization Program
5000.12	Data Elements and Data Codes Standardization Procedures
5000.16	Joint Logistics and Personnel Policy and Guidance
5000.19	Policies for the Management and Control of Information Requirements
5000.27	Logistics Data Element Standardization and Management Program
5000.28	Design to Cost
5000.29	Management of Computer Resources in Major Defense Systems
5000.33	Uniform Budget/Cost Terms and Definitions
5000.34	Defense Production Management
5000.36	System Safety Engineering and Management
5000.37	Acquisition and Distribution of Commercial Products (ADCP)
5000.38	Production Readiness Reviews
5000.39	Acquisition and Management of ILS for Systems and Equipment
5000.40	Reliability and Maintainability
5000.43	Acquisition Streamlining
5000.44	Industrial Modernization Incentives Program (IMIP)
5000.45	Baselining of Selected Major Systems
5000.49	Defense Acquisition Board (DAB)
5010.12	Management of Technical Data
5010.19	Configuration Management
5010.20	Work Breakdown Structures for Defense Materiel Items
5010.21	Configuration Management Implementation Guidance
5010.31	DoD Productivity Program
5030.42	Performance of Contract Administration and Contract Audit Services in Support of NASA Contracts
5100.35	Military Communications-Electronics Board
5100.40	Responsibility for the Administration of the DoD ADP Program
5100.41	Executive Agent Responsibilities for the National Communications System
5100.43	Defense Special Missile and Astronautics Center (DEFSMAC) (S)
5100.44	Master Plan for the National Military Command System (S)
5100.50	Protection and enhancement of environmental Quality
5100.70	Implementation of Strategic Arms Limitation (SAL) Agreements
5100.72	Procedures for Implementation of SAL Agreements and Measures
5200.1	DoD Information Security Program
5200.5	Communications Security (COMSEC) (C)
5200.21	Dissemination of DoD Technical Information
5200.28	Security Requirements for Automatic Data Processing (ADP) Systems
5210.51	Security Classification of Airborne Passive Scanning IR Imaging Systems
5210.57	Security Classification of Airborne RADAR Imaging Systems

5210.61	Security Classification of Information Concerning High Energy Lasers
5210.69	Security Classification of Particle Beam Weapon Technology & Systems
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7045.14	The Planning, Programming, and Budgeting System (PPBS)
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7150.5	RESP for Programming and Financing Facilities at DoD Installations Utilized by Two or More DoD Components
7200.4	Full Funding of DoD Procurement Programs

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761	Human Engineering Guidelines for Management Information Systems

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5000.2	Defense Acquisition Program Procedures
5000.33	Uniform Budget/GST Terms and Definitions
5000.36	System Safety Engineering and Management
7000.3	Selected Acquisition Reports

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100D	Engineering Drawing Practices
248A	Guide for Application and Tailoring of Requirements for Defense Material Acquisition
480	Configuration Control, Engineering changes, Deviations, and Waivers
863B	Preparation of Wiring Data and Schematic Diagrams
1476A	Metric System, Application in New Design
1477	Symbols for Army Air Defense Systems
2167	Defense System Software Development

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217E	Reliability Prediction of Electronic Equipment
245B	Preparation of Statement of Work (SOW)
472	Maintainability Prediction
727	Design Guidance for Producibility
759A	Human Factors Engineering Design for Army Materiel
46855B	Human Engineering Requirements for MIL Systems, Equipment & Facilities (Metric)

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DOD-M-24680	General Requirements for Metric Machinery/Equipment
DOD-D-1000	Drawings, Engineering and Associated Lists

MILITARY EQUIPMENT (MIL-E)

E-17555H	Packaging of Electronic and Electrical Equipment Accessories and Provisioned Items

MILITARY MANUALS (MIL-M)

M-24100	Functionally Oriented Maintenance Manuals for Systems and Equipment
M-38793	Calibration and Alignment

MILITARY PHAMPLET (MIL-P)

P-116H	Methods of Preservation
P-9024G	Packaging, Handling, and Transportability in System/Equipment Acquisition

MILITARY (MIL-S)

S-83490	Specifications, Types and Forms

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T-29053B	Requirements for Training System Development
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415	Design Criteria for Test Provisions for Electronic Systems & Equipment
454J	Standard General Requirements for Electronic Equipment
470A	Maintainability Program Requirements for Systems and Equipment
471B	Maintainability
480	Configuration Control - Engineering changes, Deviations, and Waivers
481	Configuration Control - Engineering changes, Deviations & Waivers
482A	Configuration Status Accounting Data Element and Related Features
483	Interface Design compatibility
490A	Specification Practices
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648A	Design Criteria for Specialized Shipping Containers
721B	Definitions of Effectiveness Terms for Reliability, Maintenance, Human Factors, and Safety
756B	Reliability Modeling and Prediction
781C	Reliability Design qualification and Production Acceptance Tests
785B	Reliability Program for Systems and Equipment Development and Production
789C	Contractor Technical Information Coding of Replenishment Parts
790	Reliability Assurance Program for Electronic Parts Specifications
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881A	Work Breakdown Structures for Defense Materiel Items
882B	System Safety Program for Systems and Associated SubSystems and Equipment
885B	Procurement Data Packages
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965A	Parts Control Program
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1365A	General Design Criteria for Handling Equipment Associated With Weapons and Related Items
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1388-2A	DoD Requirements for a Logistic Support Analysis Record
1472C	Human Engineering Design Criteria for MIL Systems, Equipment & Facilities
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1519	Preparation of Test Requirements Documents
1521	Technical Reviews and Audits for Systems, Equipment & Computer Programs
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1538	Spare Parts & Maintenance Support of Space & Missile Systems in RDT&E
1543A	Reliability Program Requirements for Space & Missile Systems
1545	Optional Spare Parts Maintenance and Inventory Support of Space and Missile Systems
1546	CFE VS GFE Selection Process
1552	Uniform DoD Provisioning Technical Documentation
1556	Government-Industry Data Exchange Program (GIDEP)
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1635	Reliability Growth Testing
1815A	ADA Programming Language
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1843	Reliability-Centered Maintenance for Aircraft, Engines and Equipment
2072	Establishment and Conduct of Programs for Aircraft Survivability
2073-1A	DoD Materiel Procedures for Development and Application of Packaging Requirements
2077A	General Requirements Test Program Sets
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55-90	Electronic Warfare Policy
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800-19	System or Equipment Turnover
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800-22	CFE VS GFE Selection Process
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800-26	Spares Acquisition Integrated with Production
800-36	Provisioning of Spares and Repair Parts
800-45	Modular Avionics System Architecture (MASA) ILS Requirements

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55-43	Evaluation Criteria for Operational Testing
66-279	Core Automated Maintenance System (CAMS)
75-32	Terminal Facilities Guide: Commercial Contractors
86-1	Military Construction Program
86-2	Air Force Design Manual (Definite Designs of Air Force)
88-2	Standard Facility Requirements

88-15 Air Force Design Manual - Standards for AF Criteria
127-100 Explosive Safety Standards
172-1 USAF Budget Manual

JOINT AIR FORCE LOGISTICS COMMAND/SYSTEMS COMMAND REGULATIONS (AFLCR/AFSCR)

66-75 Depot Maint Source of Repair Decision Tree Analysis Reporting Procedures

800-20 Defective Parts and Components Control Program (DPCCP)
800-24 Standard Integrated Support Management System

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80-5 Cost-Effectiveness Analysis
800-7 Integrated Logistic Support Implementation Guide for DoD Systems

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400-11 Reliability and Maintainability Sources
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AIR FORCE TECHNICAL ORDERS (TO)

00-25-195 Source, Maintenance and Recoverability Coding of AF Weapon Systems and Equipment
00-35D-54 USAF Materiel Deficiency Reporting and Investigating System

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700-97	Logistics Capability Estimates
700-120	Materiel Distribution Management
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700-129	LS Management of Multi-Service Comms-Electronic Systems & Equipment
702-3	Army Materiel Reliability, Availability, and Maintainability (RAM)
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708-1	Cataloging and Supply Management Data
708-17	Federal Manual for Supply Cataloging, Chapter 7; Format Content and Preparation of the FSC Publications
710-1	Centralized Inventory Management of the Army Supply System
710-2	Materiel Management for Using Units, Support Units, and Installations
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715-22	High Dollar Spare Parts Breakout Program
725-1	Special Authorization and Procedures for Issues, Sales, and Loans
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750-43	Test, Measurement, and Diagnostic Equipment (TMDE)
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700-1 Integrated Logistic Support

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38-703-1 Integrated Logistic Support (ILS) Integration
38-703-3 ILS Maintenance Engineering Analysis Data System
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38-710 ILS Implementation Guide for DoD Systems and Equipment
38-715 Processing Requirements for US Army Equipment (PR- 1)
38-750 The Army Maintenance Management System (TAMMS)
38-760-1 A Guide to System Engineering

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11-5	Standards for Presentation and Documentation of LCC Estimates
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70-2	Materiel Acquisition Handbook
70-21	The Coordinated Test Plan
700-20	DA Test, Measurement, and Diagnostic Equipment Register
700-50	Integrated Logistics Support: Developmental Supportability Test and Evaluation Guide
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750-21	Logistic Support Modeling
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700-10	Provisioning Techniques
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706-134	Engineering Design Handbook, Maintainability Guide for Design
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5310.19	Preliminary Shipboard Manpower Document
5311.7	Determining Manpower, Personnel, and Training (MPT) Requirements for Navy Acquisitions
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4000.38	Standard Integrated Support Management System
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AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

E 380 Standard for Metric Practice

NATIONAL AEROSPACE STANDARD (NAS)

10001	Preferred Metric Units for Aerospace

NATIONAL BUREAU OF STANDARDS (NBS)

330	Special Publication - The International System of Units (SI)

INTERNATIONAL ORGANIZATION OF STANDARDS (ISO)

1000	SI Units and Recommendations for the Use of their Multiples and of Certain other Units

AMERICAN NATIONAL METRIC COUNCIL (ANMC)

78	Metric Editorial Guide